

# AI

## AUTOMOTIVE INDUSTRIES

**AUTOMOTIVE and AVIATION MANUFACTURING**  
C I V I L I A N      A N D      D E F E N S E

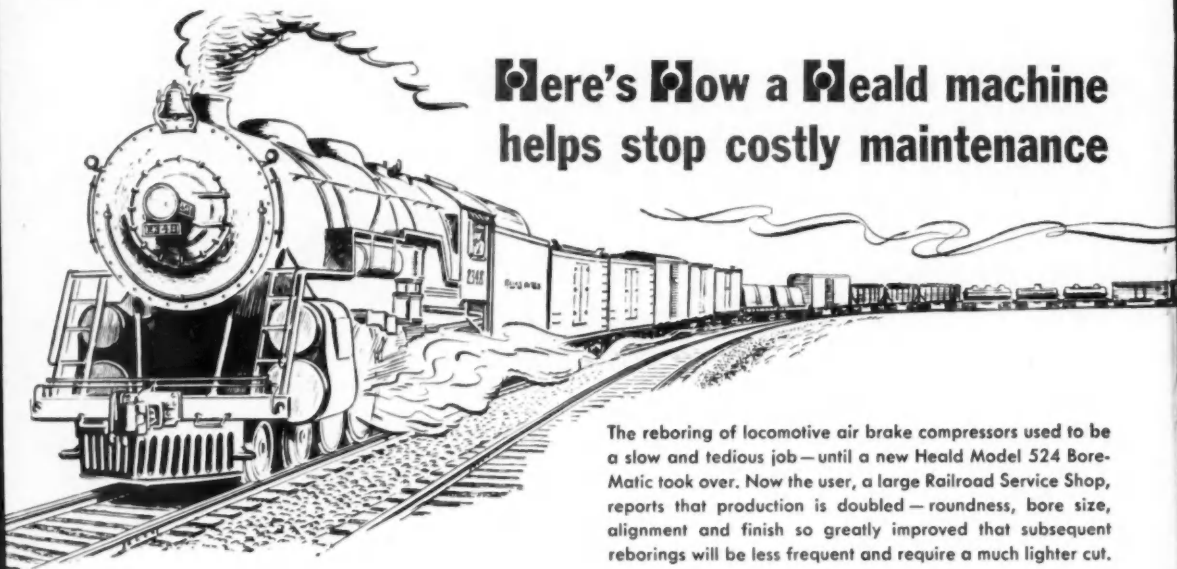
***In This Issue . . .*** Plastic Dies for Steel Panels . . . Fuller's New

**SEPTEMBER 15, 1952** Torque Converter . . . Details of Passenger Car

*Complete Table of* Gas Turbine . . . The Parking Puzzle . . . Reo's

*Contents, Page 3* Special Conveyor Setup . . . High Speed Planes

A   C H I L T O N   P U B L I C A T I O N



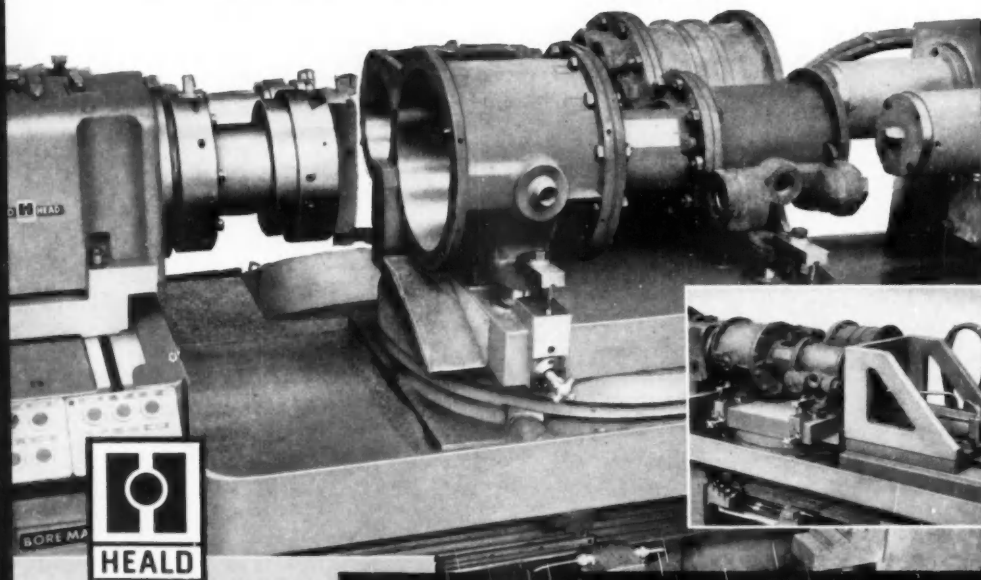
## Here's How a Heald machine helps stop costly maintenance

**Locomotive air brake  
compressor cylinders rebored  
in half the time  
— with better accuracy, too —  
on a new Heald Bore-Matic**

The reboring of locomotive air brake compressors used to be a slow and tedious job—until a new Heald Model 524 Bore-Matic took over. Now the user, a large Railroad Service Shop, reports that production is doubled—roundness, bore size, alignment and finish so greatly improved that subsequent reborings will be less frequent and require a much lighter cut.

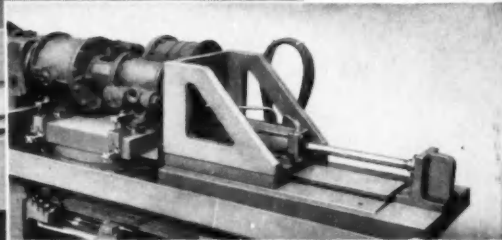
One reason for this increased speed and accuracy is the 180° indexing fixture and unique locating arrangement shown below. An hydraulic tailstock locator picks up locations on rear of part and table moves to left to locate front of part on two locators mounted on the boringheads. Part is then locked and clamped and boringhead locators are replaced by tooling. After front end is bored, work is hydraulically indexed 180° for reboring the rear cylinders.

Remember — when it comes to precision finishing, it pays to come to Heald.



Left: Front of Model 524 Bore-Matic with compressor cylinders clamped in place on hydraulic platen type 180° indexing fixture.

Below: End view of same machine showing hydraulically operated tailstock locator.



*Heald machines speed  
the nation's production*

**THE HEALD MACHINE COMPANY**

**WORCESTER 6, MASSACHUSETTS**

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



# 50-TON HAULS with WAUKESHA *Diesel*

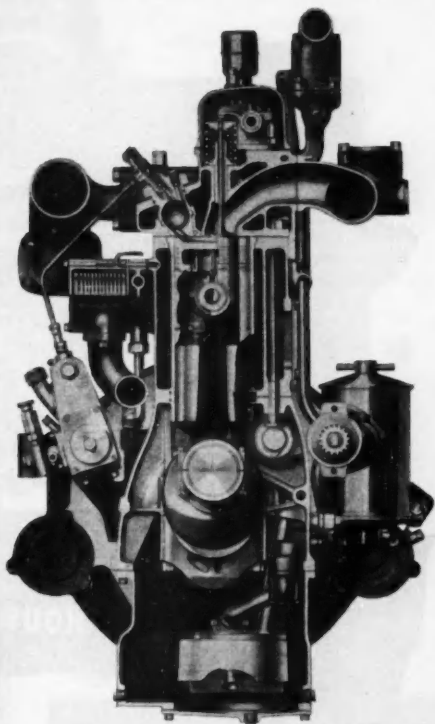
## Packed with Power to Pull Heavy Oil Field Machinery Over Mountain Roads

Here it is again — the truckers' Diesel — making more miles and putting out peak payload performance for Crail Transportation Co. of Long Beach, California. It's hauling heavy oil field machinery... as high as 100,000 lb. gross weight... over mountain roads. "This engine has been very satisfactory in every way, and has met all our requirements fully," says Mr. A. W. Swanson, Crail's president and general manager.

Among the many exclusive Diesel design features of Model 148-DK are—patented spherical combustion chamber for lively responsive acceleration, shock-free operation, clean burning, high fuel economy... counterbalanced 7-bearing, hardened crankshaft... pressure oil jets to cool piston crown... steel backed copper-lead-babbitt heavy-duty precision bearings. Get Bulletin 1532.

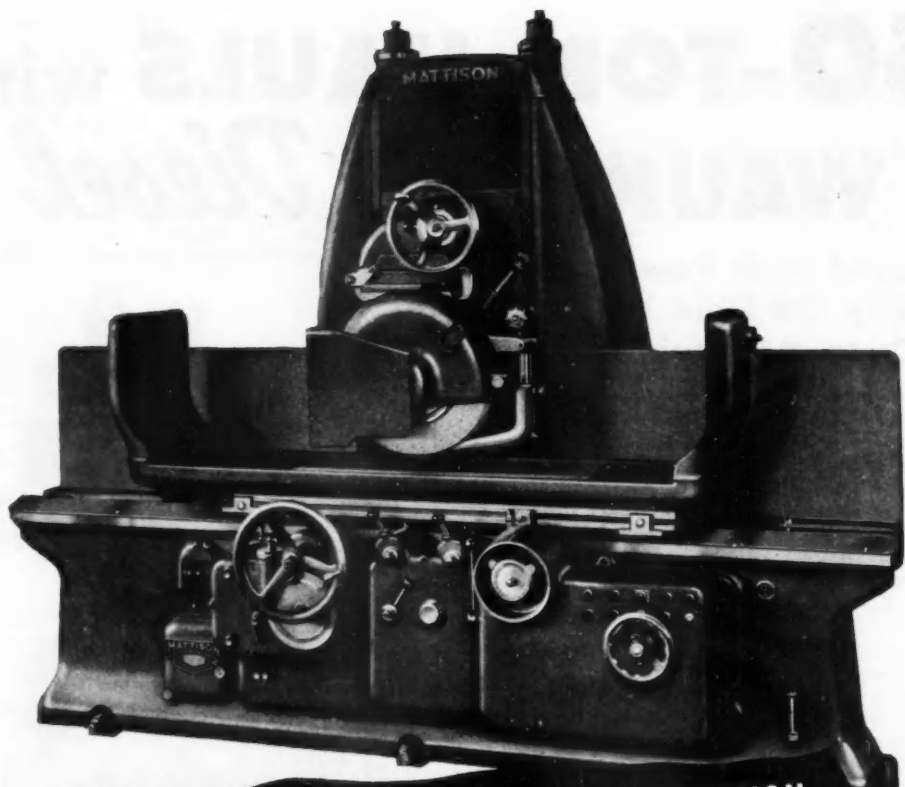
186

**WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.**  
NEW YORK • TULSA • LOS ANGELES



**WAUKESHA High-Duty DIESEL Model 148-DK**  
six-cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in.  
displacement. Peak hp 200.





**HERE'S A CHANGE THAT INCREASED PRODUCTION  
FROM 30 PER HOUR TO 200 PER HOUR**



Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production—30 per hour.

● Because of the greater load and grinding area of their Mattison High Powered Precision Surface Grinder, Geo. T. Schmidt, Inc., Chicago, Illinois have been able to effect considerable savings in grinding time over their previous method. As an example—the type stamps shown in the picture above were formerly ground a few pieces at a time on a small grinder—30 per hour. The Mattison Grinder they are now using provides larger table space and a larger grinding wheel together with the necessary power and stability to permit the grinding of more pieces per load at a production rate of 200 per hour. Similar results are obtained on other parts.

Mattison High Powered Precision Surface Grinders have the high power and rugged double-column construction for rapid stock removal and the precision necessary for high quality finish and accuracy to close limits.

This combination not only will enable you to step up production on small parts, but permits grinding large work which previously could not be handled. For further information send for free circular.

**MATTISON**

**MACHINE WORKS**

ROCKFORD • ILLINOIS

# AUTOMOTIVE INDUSTRIES

September 15, 1952

Published Semi-Monthly

Vol. 107, No. 6

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**AUTOMOTIVE INDUSTRIES**, September 15, 1952

## TOUREK

**BALL JOINTS • PIPE PLUGS  
AND QUALITY  
SCREW MACHINE PRODUCTS**

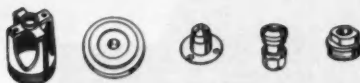


**ball joints**—By specifying Tourek Ball Joints—the only recognized standard—you can frequently simplify design, improve performance and lower costs. A wide range of standard types is available to meet most requirements. Ball Joints for special applications can be designed and produced to your specifications.



**pipe plugs**—Tourek's countersunk Pipe Plugs are accurate, high strength and economical. These advantages are yours at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: 1/4", 3/8", 1/2", 3/4", and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 1 1/2" diameter.



**screw machine products**—Tourek sets the pace for quality and service for your screw machine product requirements. A vast array of high speed precision equipment, including single and multiple-spindle automatics as well as complete secondary equipment, is backed by more than 30 years' production experience. You can depend on Tourek for "The Best In Quality Screw Machine Products."

### LITERATURE

• Comprehensive data on any or all Tourek products sent promptly upon request... write for yours now.  
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Chicago 23, Ill.



ESTABLISHED 1920

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"THE BEST IN QUALITY  
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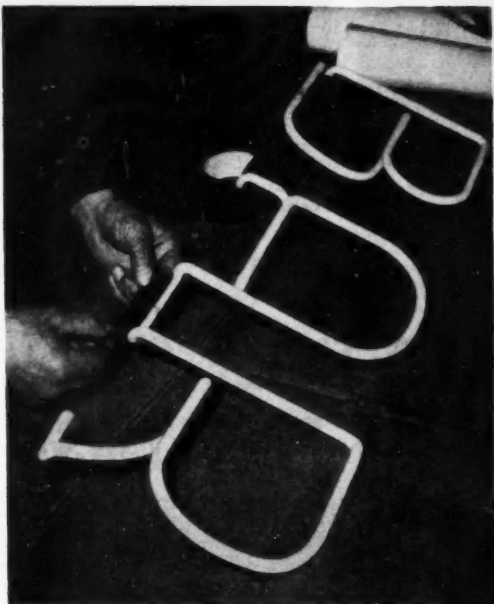
# **GALLAND-HENNING**

## **SCRAP METAL BALING PRESSES**

A 7126-1P

# WEATHERPROOF TAPE

## replaces outdoor paint



**Permanent blackout!** Polyken Tape No. 214 is used to black out sections of neon tubing quickly and permanently.

### Neon sign maker solves costly maintenance problem on outdoor installations

Appleton Neon Sign Co., Wisconsin, used to black out non-illuminated sections of neon tubes with paint. But the paint would weather off, and the blacked-out sections began to light up, creating a troublesome and expensive maintenance problem.

The answer was simple and effective: use black weather-resistant Polyken Tape No. 214 instead of paint.

Then for splicing high-voltage electrodes, the sign



**Long-life splices.** Electrodes that will carry more than 6,000 volts are spliced with Polyken No. 822, which has a 10,000 volt dielectric strength.



**This inside job** of bundling wires is made-to-order for low-cost Polyken Tape No. 163.

company switched from a vinyl plastic tape to Polyken's exclusive Polyethylene Tape No. 822. The change not only cut costs but also resulted in higher dielectric strength (over 10,000 volts) and greater insulation resistance (over 1,000,000 megohms) at the same time.

Finally costs were cut still further by a switch to Polyken Electrical Tape No. 163 for taping interior electric connections and holding wires for bundling.

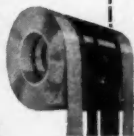
These tapes are just three of a complete line of Polyken pressure-sensitive tapes made to save you time and money. Send for free samples and booklet today.

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## INDUSTRIAL TAPES

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TAILORED TO YOUR JOB



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For specifications, samples, and further information on Nos. 163, 214, 822 and other Polyken Tapes, please send me your FREE BOOKLET, "Tape is a Tool."

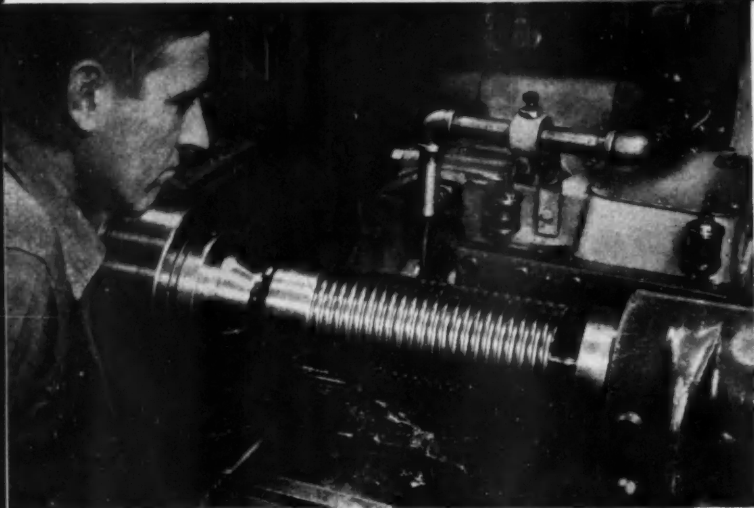
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Company \_\_\_\_\_

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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_





**THREAD MILLING A SCREW.** Metal: SAE 2345 steel heat-treated to 28 Rockwell • Machine: Lees Bradner thread miller • Part: 5/4" adjusting screw for press brake • Operations: rough and finish thread milling • Tool: high-speed steel • Feed: 0.260 depth on roughing • Cutting Oil: Sunicut 105



**BROACHING A GEAR KEY-WAY.** Metal: SAE 2345 steel forging 220 Brinnell • Machine: 3L8 La Pointe hydraulic broach • Part: gears for shaper, produced two at a time • Tool: 3' high-speed steel broach • Cutting Oil: Sunicut 105

## SUNICUT 105 REPLACES THREE OILS AND SOLVES FIVE MAJOR PROBLEMS

Buying three cutting oils and then blending them to make additional grades had proved highly unsatisfactory to a machine tool builder. The smoke was noxious, employees complained of skin irritations, the color of the oils made it difficult to see the work, tool life was short and finishes not up to standard. To help solve these problems, the company called in a Sun representative and on his advice tested Sunicut 105 on the three tough jobs pictured here.

So good were the results that the company adopted Sunicut 105 for every machine in the plant and has used it exclusively for the past two years. The operators like its transparency. There are no complaints about smoke or skin irritations. Finishes have improved and tool life increased as much as 50 percent.

For complete information on Sun's cutting oils, write to Department AA-9 and we will send you a copy of our informative, illustrated booklet "Cutting and Grinding Facts."

**CUTTING A LARGE GEAR.** Metal: bronze 180 Brinnell • Machine: Gould & Eberhardt gear hobbing machine • Part: main drive worm gear wheel for large shear • 42 3/8" O. D.; 5" thick; 87 teeth • Tool: high-speed steel hob • Feed: 0.006 • Speed: 42 rpm • Cutting Oil: Sunicut 105



### SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



An aerial, black and white photograph of a large parking lot filled with numerous vintage cars from the early 1950s. The cars are parked in neat rows, and the perspective is from directly above, looking down at the vehicles. The lot is bordered by some trees and a building in the upper left corner.

## Smoother Operation with HYATTS

There are over 52 million automobiles and trucks in service in the U.S.A.

Most of them depend on Hyatt Quiet Roller Bearings for some of their smoother operation.

You will find these better bearings doing duty in differentials—rear wheels—pinions—transmissions—steering gears and other vital positions.

Millions and millions of Hyatt Quiet Roller Bearings, since 1892 have proved by their performance, that in design, precision and quality Hyatts are thoroughly dependable.

Leaders in the automotive industry since its inception, have built Hyatts into cars, trucks and buses for smoother operation. Long, satisfactory experience justifies their choice. Hyatts make a money-saving contribution to smoother operation. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J., and Detroit, Mich.

# HYATT ROLLER BEARINGS

# Now...Triple Protection

## WITH NEW HEAVY-DUTY UNITED Air Cleaner

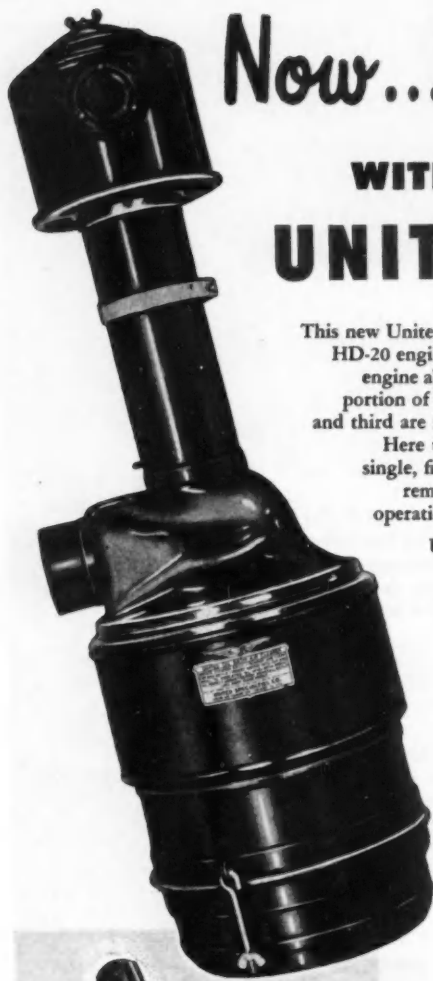
This new United Oil Bath Air Cleaner which protects the Allis-Chalmers HD-20 engine provides a three-point safeguard against dust and other engine abrasives. The first is the pre-cleaner which removes a major portion of airborne dust before it reaches the air cleaner. The second and third are in the newly designed oil bath element of the air cleaner.

Here two separate, removable filter elements have replaced the single, fixed cleaning element. These dust-trapping units are easily removable for thorough cleaning and servicing, thus assuring operation of cleaner at top efficiency at all times.

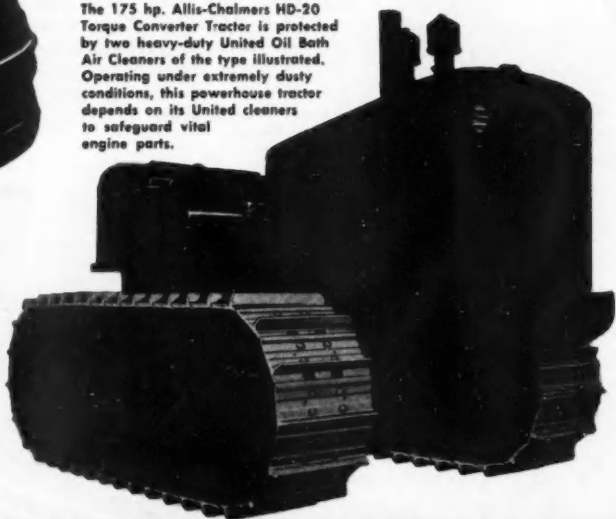
Under test conditions far more severe than are encountered during average working conditions, this new United Oil Bath Air Cleaner removed over 98.6 percent of harmful dust and abrasives from air entering engine.

United air cleaner engineers working closely with customers' technicians are constantly providing new, improved air cleaner designs for a wide variety of internal combustion engines.

The 175 hp. Allis-Chalmers HD-20 Torque Converter Tractor is protected by two heavy-duty United Oil Bath Air Cleaners of the type illustrated. Operating under extremely dusty conditions, this powerhouse tractor depends on its United cleaners to safeguard vital engine parts.



Exploded view showing new air cleaner with removable filter elements. These easily removable discs can be taken out, serviced and replaced with a minimum of effort and time.



### UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28

Mitchell Division — Philadelphia 36

Birmingham 11, Alabama

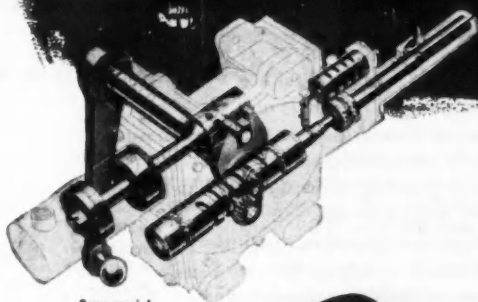
AIR CLEANERS • METAL STAMPINGS • ROLLED SHAPES  
IGNITION AND TURN SIGNAL SWITCHES • DOVETAILS

**Ross** HYDRAULIC POWER STEERING ... SINCE 1942



*Alert...  
Responsive...*

**POWERFUL...**



Commercial  
MODEL HP-70

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***Easier, Safer* STEERING FOR  
COMMERCIAL VEHICLES AND PASSENGER CARS**

**Earning power**—Ross Hydrapower gives effortless, fatigueless steering that *steps up* operator efficiency ... *speeds* schedules.

**Safety insurance**—Ross Hydrapower provides *instant* protection against loss of control through blow-outs ... road obstructions ... soft or bumpy terrain.

**Under every** driving condition—Ross Hydrapower gives new steering *ease* and *safety* for driver and passengers ... new *protection* for vehicle and payload.

We invite discussion of any steering problem.

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

AUTOMOTIVE INDUSTRIES, September 15, 1952



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*Synthetic*  
**RUBBER**  
**COMPONENT**  
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- Tubing
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# SQUEEZE PLAY

35 ton "Hy-Power" Riveter attaching brake backing plate assembly to rear axle housing with cold rivets.

## ...on assembly costs

Yes, you can really put a "squeeze play" on assembly and production costs with a Hannifin silent-squeeze "Hy-Power" Riveter. It can take over your riveting operations—and many types of pressing, punching, forming and bending jobs—do them silently with push-button ease and efficiency that up production, reduce cost.

Heart of the "Hy-Power" hydraulic system is the unique "Hy-Power" Generator—a combination of motor, pump, oil reservoir, control valves and high pressure intensifier assembled as a compact, self-contained unit.

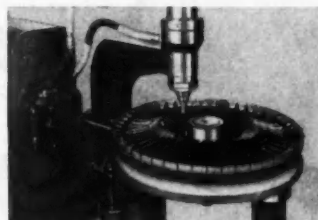
It powers the "Hy-Power" Riveter—the work tool that silently forms cold rivets at the touch of a button.

For a thorough discussion of how "Hy-Power" equipment can be utilized best in your plant, ask to have a Hannifin field engineer arrange an appointment with you.

Also, WRITE FOR YOUR COPY OF BULLETIN 150—"Hy-Power" Hydraulics Hannifin Corporation, 1143 S. Kilbourn Avenue, Chicago 24, Illinois.



One man handles this 50-ton "Hy-Power" Riveter with effortless ease in working on railroad car underframes.



A stationary "Hy-Power" Riveter joins hub and runner assembly of hydraulic couplings.

do ALL you CAN do . . . with

# HANNIFIN

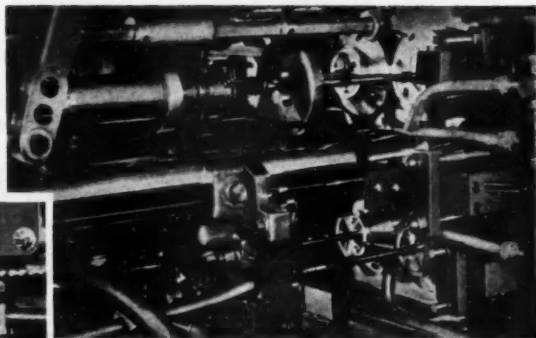
Air Cylinders • Hydraulic Cylinders • Hydraulic Power Units • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Units • Air Control Valves

Although certain types of shaft jobs offer natural opportunity as bar machine work, with the exception of the CONOMATIC, seldom do they appear on multiple spindle bar automatics. In general, shaft jobs require a longer tooling area than do other types of bar work.

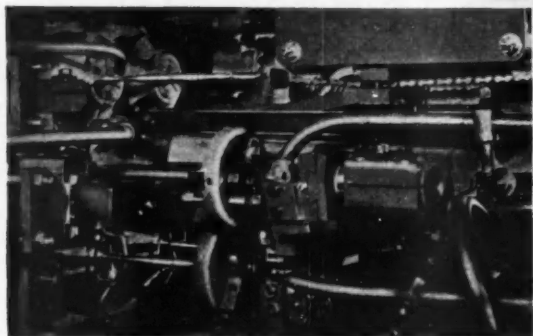
A glance at the frame design of the CONOMATIC explains why its tooling area is longer\* than the tooling areas of other "automatics." And there are more tool positions\* and more room\* for tool setting for any type of job.

\*You can have the figures

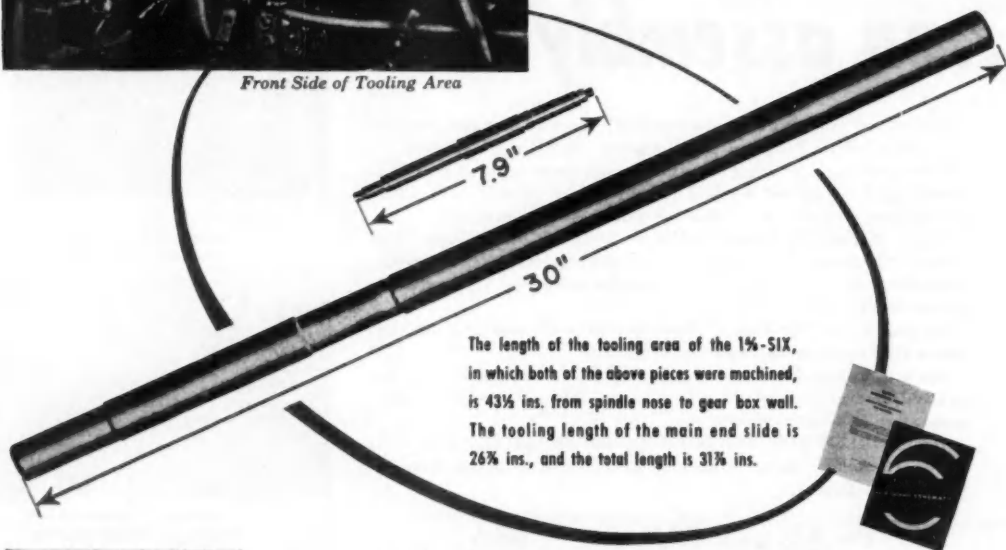
## THERE'S *More* THAN JUST "Elbow Room"



Rear Side of Tooling Area

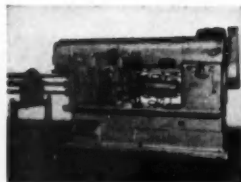


Front Side of Tooling Area



The length of the tooling area of the 1½-SIX, in which both of the above pieces were machined, is 43½ ins. from spindle nose to gear box wall. The tooling length of the main end slide is 26½ ins., and the total length is 31½ ins.

*A Comparison of ALL Automatics is in favor of Cone*



# Conomatic}

CONE AUTOMATIC  
MACHINE COMPANY, INC.  
WINDSOR, VT., U.S.A.

another job for **Brainard** TUBING

## EXPRESSWAY FOR HOT MAIL

● Precision is important in pneumatic tube systems . . . a big reason why Brainard Electric-welded Tubing is so widely used for this application.

Brainard Tubing is produced to close tolerances, with a smooth inside finish. In straight or bent sections, the bore is a smooth expressway for the carrier cylinders.

Strength is uniform. Sections can be joined by a variety of methods, simplifying the work of both designer and fabricator. And . . . electric-welded tubing is far more economical than other types.

Brainard's integrated production facilities assure quality control throughout manufacture . . . from ore to finished tubing. Depend on Brainard service for *your* needs.



### EASY TO FABRICATE

Brainard tubing is a uniform product made to close tolerances. Has good machining qualities and finish can be supplied as specified. Easily fabricated—can be beaded, expanded, swaged, spun, flanged, upset, grooved, fluted, flattened, tapered, and otherwise formed. Supplied straight or fabricated, sizes ½" to 4" O.D.; .025 to .180 gage.

Fast delivery on certain sizes. For further information or catalog, write Brainard Steel Division, Sharon Steel Corporation, Dept. W-9, Griswold St., Warren, Ohio.

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# The Sign OF SMOOTH, SURE STOPS!

## THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

More than two and a half million installations have made Hydrovac the undisputed leader in the field of power braking. And now Bendix Products offers Air-Pak, an air-hydraulic unit similar in design and principle to the Hydrovac. Air-Pak changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

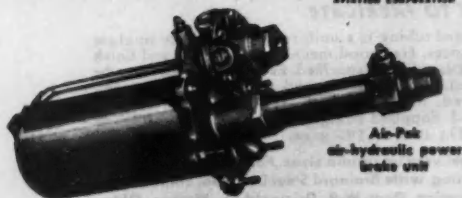
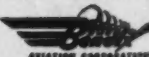
Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance.

Remember, regardless of size of vehicle or whether your preference is for vacuum or air brakes, for the industry's finest power braking systems be sure to specify Bendix® Hydrovac® or Bendix Air-Pak.

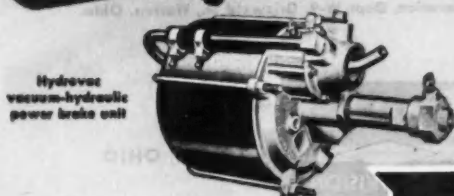
\*REG. U. S. PAT. OFF.

### BENDIX • PRODUCTS DIVISION • SOUTH BEND

Export Sales: Bendix International Division, 72 Fifth Ave., New York 11, N.Y. • Canadian Sales: Bendix-Sellpac of Canada, Ltd., Windsor, Ontario, Canada



Air-Pak  
air-hydraulic power  
brake unit



Hydrovac  
vacuum-hydraulic  
power brake unit

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## High Spots of This Issue

### ★ The Parking Puzzle and How It Is Being Solved

A nightmare for motorists, municipalities, and merchants alike, the parking problem has been the subject of much study. Presented here is a summary of a survey on what is being done to combat this bugaboo. See Page 32.

### ★ New Aluminum Plant Powered by 83 Gas Engines

The installation of gas engines was a "natural" at Reynolds Metals Company's new Texas aluminum reduction plant with bountiful natural gas resources nearby. The design and operation of the units is described. Page 36.

### ★ Efficient Heat Treating of Large Transmission Parts

The problem of reconciling normal civilian production with defense work is a familiar problem to many manufacturers today. The ways and means by which GM's Allison Div. has tackled the task are outlined here. Page 38.

### ★ New Materials Forms Required for High Speed Planes

The "heat barrier," one of the prime obstacles in the path of even greater aircraft speeds, has become the focal point of much research. The materials needed for its conquest are discussed in this article. See Page 42.

### ★ Reo Conveyor Setup Cuts Materials Handling Costs

The pinch on the pocketbook resulting from a formerly inefficient materials handling setup on the ground has been relieved at Reo by flight to the air on a unique conveyor system. Its operation is detailed here. Page 48.

### ★ 22 New Product Items And Other High Spots, Such As:

Steel panels for trucks made in plastic die; the SAE West Coast meeting; British Rover gas turbine develops over 200 horsepower; substantial automobile exports foreseen for Australia; general purpose machines used to make Packard Diesels; Fuller announces new torque converter; and time saving method for tapering aircraft skins.

**Automotive and Aviation News, Page 17**  
**Complete Table of Contents, Page 3**

AUTOMOTIVE INDUSTRIES COVERS  
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES  
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY  
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT  
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT  
ENGINEERING • PRODUCTION • MANAGEMENT



# Ingenious Ways of Getting Steel

Steel continues in short supply from causes well known to all.

However, business must go on, and our customers, with the close cooperation of Ryerson engineers and metallurgists, are performing near miracles in order to keep the wheels of industry turning.

Leaner alloys are being heat treated and used where it was never believed they could possibly serve. Available chrome stainless is doing some jobs better than the restricted nickel chrome formerly used.

When large rounds are not in stock we are furnishing forgings, which are stronger and quite satisfactory.

Hot rolled bars are being machined when cold rolled bars are unavailable, and cold rolled bars are being used where only hot rolled bars were used before.

Heavier and larger welded tubing is replacing hard-to-get seamless, and available square welded tubing is being used in structural applications formerly requiring angles, channels or beams.

To meet one customer's rush order for 18" plate circles, we secured the left-over center pieces from a second customer who was cutting 20" plate rings. And on another recent occasion we furnished T's not otherwise available by splitting a number of I beams.

Sheet metal users are providing us with drawings showing the exact size and shape of

the various pieces of sheets they require. We're cutting these requirements—sometimes by the thousands—from other small or odd shaped pieces, thus permitting the customer to continue in production.

On other products we are asking for the exact size and length needed so we can fill orders from shorts even though we're not able to furnish the steel from our regular stocks.

In addition we have operated a steel and machinery exchange in the Ryerson Pictorial to expand the available supply and now are receiving lists of material from customers and passing them on to others through our sales representatives.

These are only a few of the many ways in which we are helping steel users meet their requirements.

Obviously, we are not always able to come through, but we invite you to call on Ryerson experience and facilities when you need steel. We will always do our best and sometimes the results may surprise you.

\* \* \*

While at the moment a portion of certain products must be reserved for defense purposes, the strike is over and our inventories are being replenished. We hope that before many months we may be able to furnish all the steel you need.

PRINCIPAL PRODUCTS: • CARBON • STAINLESS & ALLOY STEEL • BARS • STRUCTURALS • PLATES • SHEETS • TUBING, ETC.

## RYERSON STEEL

JOSEPH T. RYERSON & SON, INC.—STEEL SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND  
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SEATTLE • SPOKANE

# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 107, No. 6

September 15, 1952

## GM to Expand Output Of Power Steering

Acceptance of power steering as optional equipment on automobiles has amazed companies now offering it, especially in view of the cost, which ranges very close to \$200. Companies in the high priced field which do not now offer the device but are expected to have it available in 1953 include Lincoln and Packard, who probably will use the Bendix unit. There also is a possibility that power steering may be extended to the Pontiac line next year, and to others in the medium priced field.

General Motors Corp. apparently is convinced that power steering will increase in demand and is planning to build a third plant at Saginaw, Mich., to produce the units. On the basis of employment expected at the new plant, which will not be completed until very late next year, production should be increased by about 40 per cent.

## Jet Transport Plans Announced By Boeing

Boeing Airplane Co. announced recently it has for some time been engaged in a company-financed project which will enable it to demonstrate a prototype jet airplane of new design to the armed services and the commercial airlines in the summer of 1954. This is believed to be the first commercial airframe builder in this country to set a date for its jet transport to fly.

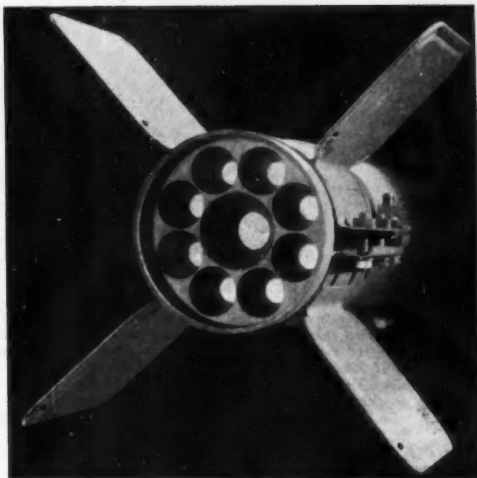
## Three New Tubeless Tires

Two tubeless passenger tires and a new tubeless aircraft tire were announced recently.

B. F. Goodrich Co. has developed a companion to its puncture-sealing tubeless tire now on the market. The new tire includes many of the safety

## ROCKET MOTOR DRIVE UNIT

Shown here is an unusual view of the "accelerator" of a motor for a five-in. aircraft rocket. Thousands of the motors are being produced at Firestone Tire & Rubber Co. for the Navy. Escape of the exhaust gases through the multi-exhaust nozzle controls the speed and direction of the missile on its way to the target. The four paddle-like fins guide the rocket.



features of the present tire, and will sell at a lower price without the puncture-sealing feature. Goodrich also announced a new tubeless aircraft tire for jet planes, which will be serviceable from -65F to 160F at landing speeds up to 250 mph.

Firestone Tire & Rubber Co. is now in production on a new tubeless passenger car tire incorporating racing-tire construction principles. It is said to have passed sustained speed tests at well over 110 mph.

## English Car Makers Working on Turbine

A report from London says that Austin Motor Co. has applied for patents on a gas turbine engine for cars and trucks. It is reported that the engine, still in the experimental stage, gives reasonable fuel economy—major obstacle thus far to use of such power plants in automotive vehicles. The report says further that Rootes, Ltd., also is working on an experimental jet engine for automobiles.

## Machine Tool Orders Show Upward Trend

New orders for machine tools during July showed a sharp upturn, while at the same time cancellations dropped markedly. New orders for the month totalled more than \$110 million—the highest since last October. The increase in business is credited largely to the government's action in removing curbs from machine tool orders for civilian industry. Cancellations in July dropped to 13 per cent of new orders placed, the lowest figure so far this year. In February, cancellations ran 47 per cent of new orders. NMTBA reports that dollar shipments through July of this year totalled \$609 million, in contrast to \$632 million for all of 1951. For all of this year it is estimated that shipments should total more than \$1.1 billion. Present ratio of unfilled orders to the demonstrated production rate at the end of July stood at 12.8 to 1, up slightly from the end of June.

# News of the AUTOMOTIVE



**BEDFORD THREE-TON TRUCK**

Although built primarily for the British military, this three-ton, four-wheel drive, four-by-four Bedford truck will soon be made available to some civilian markets. Similar to the Bedford seven-ton model, it has the same 300 cu in. gas engine developing 110 bhp at 3000 rpm and comparable full-floating front and rear axles with hypoid final drive. Main differences are in wider-tread, single fenders and compressed air for brake application. Transfer box is of two-shaft type, and power takeoff is provided. Designed to haul trailers, overall width of the truck is about 94 in.

## **Military Buys More Commercial Trucks**

The military services are backing up their intention to use commercial type trucks wherever possible. Dodge Div. of Chrysler Corp. has been awarded an order for 3439 commercial type trucks valued at about \$4.75 million to be used by the Army, Navy, and Air Force. The order includes half-ton and two-ton models, and the four-wheel drive model which is equipped for use over rough terrain. Large savings are involved in the use of commercial vehicles; the Dodge order averages out at something less than \$1400 per vehicle, which is considerably under the retail price for similar trucks.

International Harvester Co. also has been awarded a truck order amounting to more than \$22 million for vehicles and spare parts.

## **Churchill New Chief Studebaker Engineer**

Harold E. Churchill has been appointed chief engineer of Studebaker Corp. to fill the vacancy resulting

from the death of Stanwood W. Sparrow, vice president in charge of engineering. Mr. Churchill formerly was director of research and has been associated with Studebaker for 26 years, holding several important engineering posts during that time.

## **B. F. Goodrich to Make Cold Rubber in Plant**

The first commercial use of a "cold" or low-temperature polymerization process in privately-owned U. S. rubber-making plants has been started by B. F. Goodrich Chemical Co., according to a recent announcement. Hycar oil-resistant rubbers made by the method are now available and are said to provide longer product life and better performance.

## **RFC Names Attorney To K-F Directorate**

Alan E. Schwartz, a Detroit attorney, has been elected a member of the Kaiser-Frazer board of directors to represent the RFC. Kaiser-Frazer currently has RFC loans amounting to nearly \$40 million.

## **Oldsmobile Films Valve Operation**

Oldsmobile Div. of General Motors Corp. is using ultra-high speed photography and a wire sound recorder in test work on valve mechanisms of its V-8 engine. A high speed movie camera, used to record the movement of valves and valve lifters, has been operated at speeds as high as 15,000 frames per sec with the engine simulating operation at 4400 rpm. At that speed the camera exhausts a 100 foot roll of film in less than one second. Test procedure involves using an engine mounted on a test stand with crankshaft removed and using a modified oil system. A steel scale attached to the valve spring retainer, a Vernier gage and a stroboscope light pointed toward the camera lens are used to record valve movements.

Wire sound recordings are used to compare noise levels of various types of camshaft. Sample readings are taken of the different shafts at various speeds near idle, and the recordings are submitted to a jury of engineers to select the most quiet one.

## **Packard Gives Details on Custom Sports Car**

Packard Motor Car Co.'s Pan American, a custom sports car with a stock motor modified to deliver 185 hp was demonstrated in Detroit for the first time recently. The car had previously been shown in an exhibit at New York (see p. 18 of April 15 issue of AUTOMOTIVE INDUSTRIES). The experimental car has a customized body, although it has a strong resemblance to the company's convertible which results from using a body shell of that model as a styling base, officials said. A standard 122-in. convertible chassis is used.

No plans are ready as yet to put the car into production, although several custom models are under construction for automotive shows this fall and winter.

The car is powered by a Thunderbolt engine which has been redesigned to achieve 185 hp with a four-barrel carburetor and compression ratio of 7.8 to 1.

# AND AVIATION INDUSTRIES

## Industry Plans For Sales Battles

Recent action by NPA in reshuffling individual company allotments to give the Big Three and Studebaker a total 1.32 per cent greater share of industry output created considerable dissatisfaction, particularly at Nash-Kelvinator Corp., which now is preparing an appeal. However, the

doubt that the market will absorb that many units next year. Certainly, if all-out production is permitted, dealers will have to work to move the torrent of cars flowing out of automobile plants.

### New Model Changes

In view of the expected sales battle, several companies are preparing rather extensive changes in new

Wire wheels may return as an option on one luxury car, as a weapon in the coming upper-bracket sales battle.

### Prices Creep Up

Recent wage increases of three cents per hour under cost-of-living contracts, plus a general tendency by OPS to increase prices on all items containing copper, steel and aluminum add up to a heavy upward pressure against current automobile prices. A general price rise, however, probably will not come until new models are introduced. The whole cost-price relationship poses something of a dilemma for automobile companies already feeling the impact of customer resistance. But there is a limit to the amount of cost increase the companies can absorb and it seems quite certain that new car prices again will take a moderate hike when new models are introduced.

Increases of factory retail prices were allowed by OPS last month on certain makes: on the Pontiac, about \$13; on the Oldsmobile, about \$15; on the Henry J and Allstate, about \$54; on the Kaiser, about \$63. These were in addition to the variable selling price increases expected as a result of the recent OPS change to the dealer's-margin type of control.



**NEWEST BRITISH JET**

*The Boulton Paul P-120 jet, latest British delta-wing aircraft to be taken off the secret list, is now undergoing test flights. Built for aerodynamic research at near-sonic speeds, the plane has a wing span of over 33 ft and a length of more than 29 ft. The powerplant is reported to be a Rolls-Royce "Nene" turbojet engine.*

whole quota question at the moment is considered largely academic, since the industry feels that all production controls will be done away with by the end of the first quarter of 1953 at the latest. Copper and aluminum already are off the critical list and steel is improving very rapidly. Principal reason for protest by companies having their allotments cut is to establish a position in the event that some unforeseen development, such as an upheaval in the international situation, might make extension of controls necessary.

Looking ahead to next year, the automobile companies are expecting a very competitive sales battle after controls are removed from production. The industry has a demonstrated capacity of at least 6½ million automobiles and there is still considerable

models. Most of General Motors and all of Chrysler lines will have new styling. In addition, Dodge will have a new engine, as will the Buick Roadmaster. Both are overhead valve V-8's. These are the only two new engines slated for 1953 with the exception of the Hudson light car, which now has been pushed back to around the first of the year.

Chevrolet will make engine modifications and also will have a redesigned automatic transmission which is understood to include some type of gear drive in conjunction with the torque converter. Other companies are expected to increase horsepower for the most part, in line with the general trend toward greater advertised power ratings. Power steering and power braking also will appear on cars which have not had it.

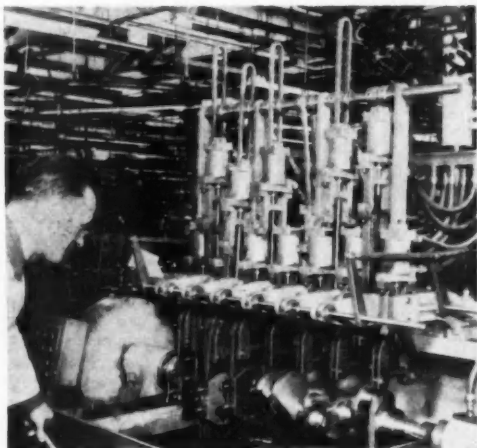
## P & W to Build Ramjet Engines

Pratt & Whitney Aircraft Div. of United Aircraft Corp., already engaged in turbojet engine production and development, will further extend its range in the jet field by developing and building ramjet engines for high-speed guided missiles.

The ramjet project, undertaken for the Navy, will involve development of various types of ramjet engines.

It was revealed that P&W will have the advantage of six years of research on ramjets under the Navy's auspices which has already been done at East Hartford, Conn., by the Research Dept. of United Aircraft Corp. A new laboratory, built exclusively for study of ramjet burners, has been operated by United Aircraft since April 6, 1950.

# News of the AUTOMOTIVE



## FATIGUE FOE

A Schraner roll-polishing machine, now in use in the engine machining dept. at Reo Motors, Inc., is designed to roll the three main bearings and two adjacent crankpins at the fly-wheel end of the Gold Comet engine crankshaft. The operation is said to increase fatigue resistance materially, thus adding to the durability of these shafts.

## General Tire Sponsors Defense Contract Pool

A new type of production pooling arrangement that enables small business firms to band together to share in defense contracts was disclosed recently by General Tire & Rubber Co.

General Tire Production Pools, Inc. has been organized to sponsor and finance the pool. As sponsor it will solicit defense contracts, assume liability for fulfillment of orders and provide sales, design, and development engineering services and offer accounting and legal assistance.

General will not do any of the manufacturing under the terms of the agreement. Production facilities will be provided by small industries in surrounding areas. Actually the tire company will take the role of any large manufacturer sub-contracting work to other firms.

## Plastics Prove Worth in Boeing Tooling

Reduction in tooling costs, a labor savings, and a cutdown in the use of strategic metals is said to be resulting from intensive use of plastics in production tooling at Boeing Airplane Co. For example, the plastic shop at Boeing's Seattle, Wash. plant

in the past year has grown from a one-man operation using five gal of resin a month to an 18-man shop using 800 gal.

One of the plastic tools reported to be proving very satisfactory is a metal-bonding jig used to fix stress members to aircraft skin with an adhesive. The company predicts that five years from now a high percentage of such aircraft production tools will be made in plastics.

## Air Race Mark Set Despite Wind

The sixth annual Continental Motors Corp. trophy race for light planes was won by Steve Wittman of Oshkosh, Wis., perennial winner who averaged 197.24 mph. The 15-lap, 37½-mile course at the Detroit International Air Exposition was made difficult by a 35-mph wind on the final race day, Sept. 1. (See p. 41 of the Sept. 1, 1951, issue of AUTOMOTIVE INDUSTRIES for a summary of race rules.)

Final standing was:

1. S. J. Wittman 197.29 mph
2. John P. Jones 197.16 mph
3. William F. Falck 194.38 mph
4. Wm. F. Brennand 192.31 mph
5. Robert A. Porter 180.72 mph

## Armed Forces to Test New Ramjet Helicopter

The Army, Navy and Marine Corps have ordered a new-type ramjet helicopter for evaluation tests. The new little two-place helicopter, named the Hornet, will be built by Hiller Helicopters and will be powered by a watermelon-size ramjet engine mounted on the tip of each of two 23-foot rotor blades.

Designated the HJ-1, the Hiller-Hornet is said to have only two hand controls, no foot controls, simple engine and transmission mechanisms. Weighing approximately 360 lb. empty, it reportedly can carry a useful load of 600 lb and has a maximum forward speed of 80 mph.

The Hiller-Hornet's twin-jet engines weigh only 12 lb each and have no moving parts, according to the manufacturer. The engines will burn almost any type of low cost fuel, and develop approximately 35 hp. each for a total power output of 70 hp.

## Canadian Show Is Largest Yet

More British cars were shown at the automobile show held at Toronto's Canadian National Exhibition, from Aug. 23 to Sept. 6, than in any other year. New 1952 models included the first showing of the Daimler Regency four-door saloon and two-door convertible coupe. The latter will move from the Toronto show to the Paris exhibition.

The German Volkswagen made its Canadian debut with a full line of models from passenger cars to buses and ambulance.

## Ford of Canada to Build Trucks, Buses for India

The Canadian Government has awarded Ford Motor Co. of Canada, Ltd., a \$3.25 million contract to build trucks and buses to be shipped to India under the Colombo Plan, the plan administrator said recently.

The contract covers 450 buses and 835 trucks, to be powered by Diesel engines. The vehicles will go to the Bombay State Transport System as a gift.



# AND AVIATION INDUSTRIES

## **Aluminum Output at Postwar High**

The U. S. aluminum industry produced 17 per cent more during the first half of 1952 than it did in the first six months of 1943, peak production year of World War II, the Aluminum Association has announced.

The June primary production of over 154 million lb brought the six-month total to over 823 million lb, an increase of 14½ per cent over the same period last year.

## **Shakeproof Opens Illinois Plant**

Shakeproof Inc., a division of Illinois Tool Works, has announced the opening of a new plant in Des Plaines, Ill., for the production of metal fastening devices and special precision stampings.

The new plant is said to make possible an expansion of the defense tooling program of the parent company. Available floor space in the new facility amounts to over 40,000 sq ft. In addition to a large press room for actual stamping operations, the plant will house a complete die making and die maintenance shop.

## **American Brake Shoe Launches Work at Steel Forging Plant**

American Brake Shoe Co. has started production at its new steel forging plant in Azusa, Calif., operated by the AmForge Div. of the company. The plant was purchased a few months ago from a steel fabricating company, and the first forging was produced just sixty days after the title papers were cleared.

The Azusa plant is located on seven acres of ground and has approximately 40,000 sq ft of floor space. Initial production will be 57 mm and 75 mm shells. Other ordnance material, aircraft parts, and regular commercial forgings will be in production in the near future.

## **Hollingshead Division Is Reclassified**

The Industrial-Aviation Div. of R. M. Hollingshead Corp. has been re-classified and in the future will be known as the Industrial Div., ac-



## **EUROPEAN ROAD RACER**

The Maserati A6G Sport is said to have a top speed of 109 mph. It is powered by a six-cyl engine developing 100 hp at 5550 rpm with three carburetors and a 7.8 to 1 compression ratio. Bore and stroke are 72 x 80 mm (2.85 x 3.14 in.), giving a displacement of 1954.32 cc (119.1 cu in.). Wheelbase is 2.55 m (100.3 in.), and the car weight is 900 kg (1980 lb).

cording to a recent announcement.

The Industrial Div. will sell and merchandise a complete line of specialty oils, specification corrosion preventives, aviation maintenance products, sanitary maintenance products, hydraulic fluids, and plastic coatings.

## **Titanium Production To Be Increased**

Defense Materials Procurement Agency has entered into an agreement under which E. I. du Pont de Nemours & Co. will triple its titanium output.

This is the second such agreement written by DMPA. The first was with Titanium Metals Corp. of America, which calls for production of 18,000 tons of the wonder metal over a five year period. Du Pont will produce an extra 13,500 tons during the same period.

Under the du Pont agreement, the government will advance \$14.7 million for expansion of titanium facilities at Newport and at Edgemoor, Del. A tax certificate of necessity is pending.

A clause in the agreement protects du Pont against loss should production methods, still in the development stage, be developed which are less costly than those which are now used to produce sponge at \$5 per lb.

## **Ford Building Parts Depot at Chicago**

Ford Division has started construction of a new service parts depot and office building in Chicago. It will be located on a 14-acre site and is scheduled for completion by next August. It will have 204,000 sq ft of floor space and, in addition to supplying dealers in a 5-state area, will house the Chicago district and mid-west regional sales offices of both the Ford and Lincoln-Mercury Divs.

## **Sterling Engine Co. To Recapitalize**

Sterling Engine Co., an affiliate of Graham-Paige Corp., is preparing to submit a recapitalization plan to its stockholders. The plan is designed to remove dividend arrears on the company's two preferred stocks. Sterling at the end of June had a backlog of orders totaling nearly \$1.4 million and has recently obtained a defense contract for \$1.25 million. Additional defense orders totaling approximately \$1.5 million are under negotiation. Earnings during the first half of this year totalled \$186,750, or nearly ten times the profit for the same period last year, which was \$18,817.

# News of the AUTOMOTIVE

## Nickel Expected To Remain Short

With the continuing shortage of nickel there is no relief in sight for chrome plating on 1953 models. Removal of restrictions on use of copper for ornamental purposes has not helped the quality of plating on such parts as bumpers and hub caps.

Demand for nickel in jet engine production is expected to keep the amount available for civilian industry very tight. There have been some encouraging developments in use of ceramic coatings for steel used in jet engines and if these prove successful it may well reduce the nickel required. However, there still is much work to do and there is not likely to be any relief from the nickel shortage for many months.

## International Announces Six New Truck Models

Six new cab-over-engine truck models, with a choice of Diesel, gasoline, or liquefied petroleum gas powerplants, have been introduced by the Motor Truck Div. of International Harvester Co.

The additions to the company's L-line were identified as the Diesel-powered LCD-405, LFCD-405, and LTCD-405, and the gasoline or LPG-powered LC-405, LFC-405, and LTC-405 models. Axle selections available in the new series include single-reduction, double-reduction, and two-speed axle drive in the LC and LCD four-wheel units.

The LTC and LTCD vehicles feature the same choice of single axle drive units in combination with dead (load-carrying) axles in either pushing or trailing arrangement. A selection of five dual-drive tandem-axle assemblies is offered in the LFC and LFCD models.

The LCD-405, LFCD-405, and LTCD-405 are available with either the standard or any of ten optional Diesel engines, ranging from 165 to 300 hp. Similarly, a selection of engine power to fit every hauling job is available in the LC-405, LFC-405, and LTC-405 models.

Four sizes of gasoline engines are available, with adaptations for use of

liquefied petroleum gas. These engines range in horsepower from 266 to 356. Optional transmissions include four, five, and ten-speed designs. Green-tinted safety glass is also offered.

## Rinshed-Mason Purchases Canadian Standard Paint

Rinshed-Mason Co. has purchased Standard Paint and Varnish Co., Ltd., of Windsor, Canada, according to a recent announcement.

The Standard trade name will be retained, and to the company's line of industrial and commercial paints and finishes will be added the automotive, farm equipment, and specialized industrial and military finishes now being produced at R-M.

## Borg-Warner Acquires E. C. Atkins and Co.

The acquisition of E. C. Atkins and Co. of Indianapolis, Ind., century-old saw manufacturing concern, by Borg-Warner Corp. was disclosed recently. The company will be operated as the Atkins Div. of Borg-Warner.

The transfer was effected by an exchange of Borg-Warner common shares for the outstanding stock of all of the Atkins stockholders.

## Westinghouse Air Brake Offers to Purchase Stock of Le Roi

Westinghouse Air Brake Co. recently offered to purchase a large block of Le Roi Co. stock.

The former is said to be offering \$9 per share to the holders of the common stock and \$53.75 per share to the holders of the preferred stock of Le Roi Co., provided that 400,000 shares of Le Roi common stock are deposited with a Chicago, Ill., bank, Sept. 15, 1952. There are presently 576,000 shares of common stock outstanding.

## Kaiser Group Gets Loan to Aid K-F

Recapitalization of Kaiser-Frazer Corp. is expected to be expedited by new funds made available to Henry J. Kaiser Co. The Kaiser organization has obtained a \$22 million loan from a group of banks, which will enable it to invest up to \$25 million in K-F. About \$3 million of the fund would come from the treasury of Henry J. Kaiser Co. One stipulation of the loan is that the Kaiser organization will guarantee \$20 million of outstanding RFC loans now held by K-F. The Kaiser group now holds 9 1/2 per cent of K-F common stock.



## MOBILE CYLINDER CLASSROOM

A fleet of converted buses, such as the one pictured above, are being used extensively by Miller Motor Co. to acquaint personnel of industrial plants with the proper use, maintenance, operation, and testing of air and hydraulic cylinders for the best efficiency and service life. Contained in the mobile units are numerous exhibits of cylinders in operation that are shown by company men on visits to plants.

# AND AVIATION INDUSTRIES

## Vibron Production Capacity Is Doubled by U. S. Rubber

Naugatuck Chemical Div. of United States Rubber Co. recently announced that it is doubling the capacity of its facilities for the production of Vibron polyester resins at its headquarters plant in Naugatuck, Conn.

Areas of greatest expansion have been shown in the use of the material for the manufacture of chemical-resistant pipe, translucent and transparent sheet construction materials, machine housings, materials handling equipment, radomes and other plastic parts for the aircraft industry, boats and plastic auto bodies in the sports car field.

## \$7 Million in New Contracts Signed by Ryan Aeronautical

New orders totaling \$7 million for airframe parts and aircraft engine components have been received by Ryan Aeronautical Co. in the past month, it was disclosed recently. The backlog of unfilled orders on hand now stands at more than \$70 million.

Largest of the contracts was with General Electric Co. for additional quantities of aft frames, transition liners and inner combustion chambers for J-47 jet engines.

Other contracts are with Boeing Airplane Co., Continental Motors Corp., Douglas Aircraft Co., Consolidated Vultee, Canadair, Aerona, and Piasecki Helicopter Corp.

## Two New Plants for Ontario

Exide Batteries of Canada, Ltd., announced that construction will start at once on a new plant to be built on a 10-acre site in Scarborough, Ont. It is expected to be in operation by the middle of next year in the production of storage batteries.

Construction work has begun on a new factory in London, Ont., for Plomb Tool Co., Los Angeles, Calif. This plant, the company's fifth, will provide facilities for the manufacture and distribution of Proto tools in Canada. A new corporation, known as Proto Tools of Canada, Ltd., was

formed earlier this year, and a 50-acre site was acquired in London. Completion of the new building is scheduled for Sept. 1. The plant will have a floor space of 21,000 sq ft.

## Laboratory Set Up for Metals Work

Located in a modern one-story building in Rockford, Ill., Ipsenlab of Rockford, Inc., has been established by Ipsen Industries, Inc., for the development of new techniques and the testing of methods and equipment for the treatment of metals.

Emphasis reportedly will be placed on the application of various protective gas atmospheres for the treatment of ferrous and non-ferrous materials. Bright hardening, carburizing, carbo-nitriding, annealing, tempering, and controlled oxidation tempering processes are featured.

An important function is said to be additional service to customers, including recommendations in selecting the process and type of equipment best suited for their operation, as well as the teaching of application techniques. Facilities are divided into two sections—the metallurgical laboratory and heat-treating section.

## Seiberling Plans Capital Increase

Seiberling Rubber Co. recently announced a plan to borrow \$3.75 million to increase working capital and permit sales growth. The board plans to issue 15-yr sinking fund debentures, convertible into common stock. The debentures would be sold through underwriters. Common stockholders will be asked to approve increasing the number of authorized shares, in order to provide stock for debenture conversions, at a meeting called for Oct. 7. Holders of preferred shares must approve the added debt.

## GE Announces Visual Industrial Program

A new visual program, aimed at boosting American productivity by offering a modern, step-by-step approach to the problems of industrial mechanization, has been announced by General Electric Co.

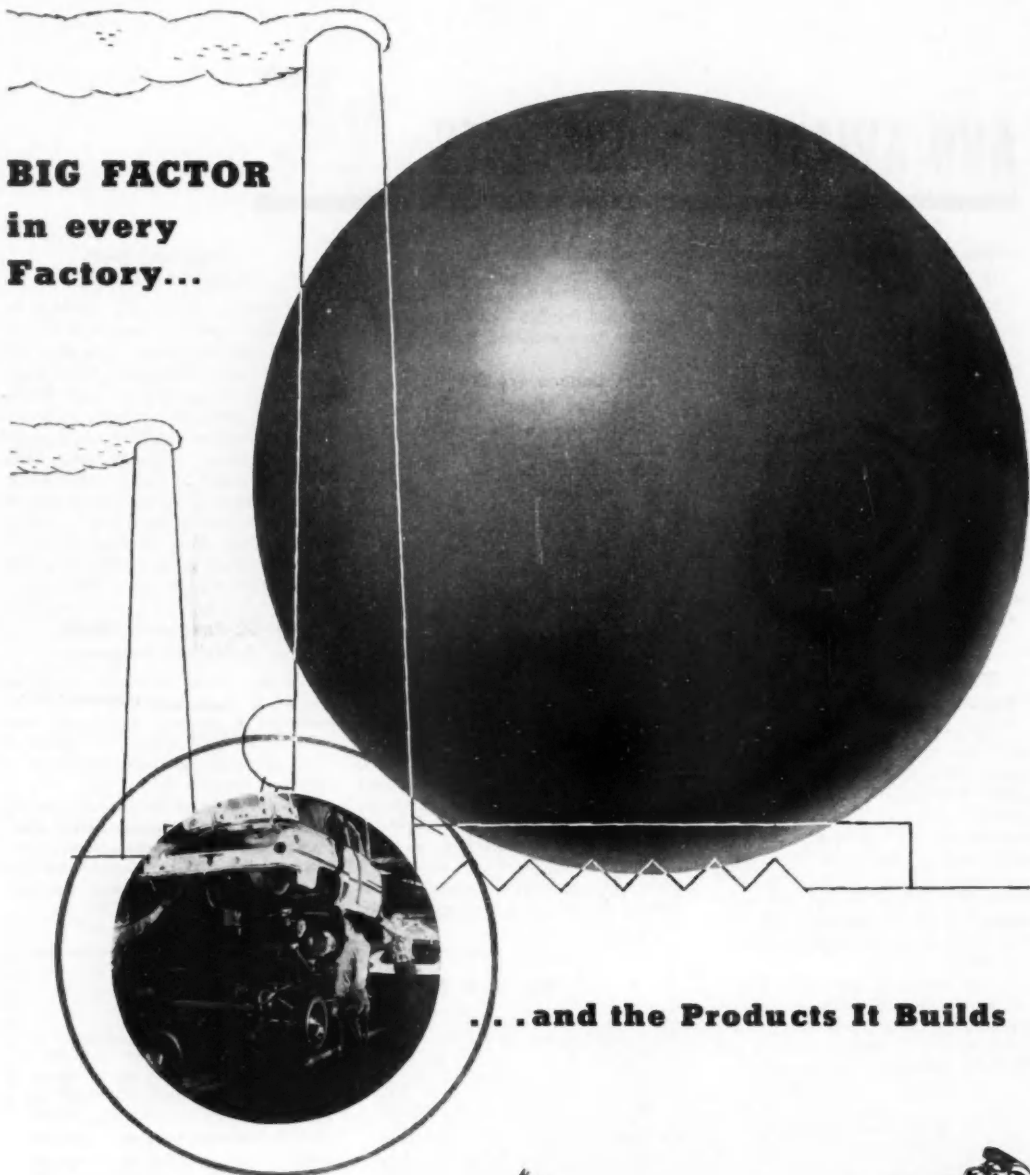
The program is designed for use by large industrial firms, machinery manufacturers, etc. It consists of three basic parts: a 16-mm sound-color motion picture, a manual, and a survey form and check list.

## 1952 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

	August 1952	July 1952	August 1951	Eight Months 1952	Eight Months 1951
Chrysler.....	5,583	4,957	14,993	77,067	119,683
De Soto.....	4,527	3,515	11,979	39,104	85,982
Dodge.....	11,467	8,520	30,061	182,314	237,122
Plymouth.....	21,294	18,065	59,343	290,498	466,840
Total—Chrysler Group.....	42,901	32,377	107,006	689,481	911,607
Ford.....	47,404	25,064	73,898	434,767	656,763
Lincoln.....	2,133	3,241	2,562	20,854	19,938
Mercury.....	13,469	9,537	16,145	111,619	169,636
Total—Ford Group.....	63,026	38,262	94,325	567,340	846,536
Buick.....	26,140	12,568	31,326	202,708	293,106
Cadillac.....	9,367	7,061	9,364	64,006	74,079
Chevrolet.....	42,316	21,932	84,394	326,200	614,737
Oldsmobile.....	14,228	9,283	22,860	142,690	207,821
Pontiac.....	17,026	12,364	27,567	171,669	249,066
Total—G. M. Group.....	168,077	64,716	175,535	1,167,923	1,639,893
Kaiser-Frazer Group.....	5,734	6,222	5,579	43,999	81,125
Hudson.....	5,966	7,069	3,065	54,231	77,012
Nash.....	6,903	3,975	16,235	44,306	113,446
Packard.....	2,826	2,346	5,714	38,434	65,679
Studebaker.....	4,634	2,901	19,190	96,739	162,562
Willys.....	1,785	1,740	3,266	32,357	21,073
Total—All Makes.....	238,871	189,863	483,023	2,994,160	3,908,397

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# Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



*Seiberling Rubber Co.—Walter T. Johnson has become assistant general sales manager.*



*Willis-Overland Export Corp.—Hickman Price, Jr., has been elected president and director.*



*Ford Motor Co., Ford Div.—C. H. O'Donohue was recently made national fleet sales manager.*

General Electric Co., Carboly Dept.—**R. R. Roberts** was recently named manager for finance.

Caterpillar Tractor Co.—**Robert W. Miller** has been elected a director.

United States Steel Corp.—**H. D. Moulton** has been appointed assistant vice president—raw materials for the U. S. Steel Co., and **C. L. Ficker** replaces him at U. S. Steel Products Div. as vice president—operations.

Austin Motor Co., Ltd.—**C. R. Melton** has been appointed the U. S. general sales manager.

Chrysler Corp., Export Div.—**T. W. Koos** is now a member of the executive staff.

Reynolds Alloys Co.—**Donald Hipp** has been promoted to vice president and manager of the company's facilities.

DeWalt, Inc.—**Samuel S. Auchincloss** has been named executive vice president.

Goodyear Tire & Rubber Co.—**Harry W. Hillman** has been advanced to controller, while **Donald H. Walker** succeeds him as assistant treasurer.

Joseph T. Ryerson & Son, Inc.—The appointment of **John W. Queen** as manager of the Cleveland plant has been announced.

Seiberling Rubber Co.—**Claude J. Gunther** has been named manager of the mileage sales department and **Ralph K. Ferguson** as service supervisor of mileage accounts.

General Electric Co. — **William Rogers Herod** has been elected a vice president and will continue as president of the International General Electric Co., which will be merged with and become a division of the company. (Turn to page 76, please)



*General Motors Corp., United Motors Service Div.—H. B. Smith has been appointed assistant general sales manager.*



*Lord Manufacturing Co.—George E. Tubb is now vice president in charge of sales.*

Carborundum Co.—**William J. Kingsley** is now assistant general sales manager.

United Specialties Co.—**M. T. Moler** has been appointed advertising manager.

Norton Co.—**Wallace L. Howe** is now director of the research and development laboratories.

Bendix Aviation Corp., Bendix Radio Div.—**Arthur C. Omberg** has been chosen director of engineering and research.

National Carbon Co. — **Arthur C. Bryan** was recently appointed vice-president in charge of sales.

Ford Motor Co., Ford Div.—**Joseph Bara** has been named national distribution manager.

Borg-Warner Corp., Warner Gear Div.—**E. Swain Russey** was elected president recently, to succeed **A. P. Emmert**, retired. **T. J. Ault**, **William H. Cortwright**, **John C. Oesterle**, and **Andrew W. Rose** were elected vice presidents.

General Electric Co., Carboly Dept.—Newly created positions are: product and process engineering manager, **E. W. Engle**; design and application engineering manager, **E. E. George**; production engineering manager, **R. A. Canning**; and administrative engineer, **R. L. Brownlee**.

## Necrology

**Hugh J. Fraser**, 55, vice president in charge of all U. S. plant operations for International Nickel Co., Inc., died Aug. 22, in Montreal, Canada.

**Elvin O. Mann**, 54, chief metallurgist for Chevrolet Div. of General Motors Corp., died Aug. 21, in Detroit, Mich.

**Edward A. Brewer**, 69, chairman of the board of Brewer-Titchener Corp., died Aug. 22, in Cortland, N. Y.

**Sherman L. Kelly**, 84, president of Zeroll Co. and one of the founders of Electric Auto-Lite Co., died Aug. 22, in Toledo, O.

**Gerald Kochenderfer**, 67, wartime head of the War Production Board's Machine Tool Div. and former Warner & Swasey Co. branch manager, died Aug. 26, in Cleveland, O.



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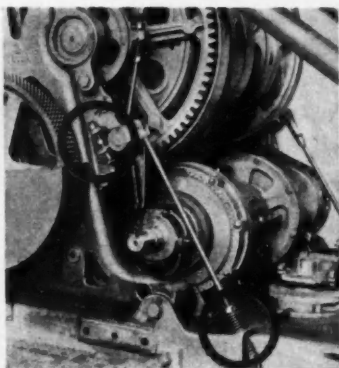
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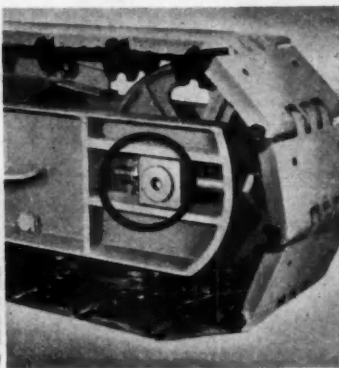
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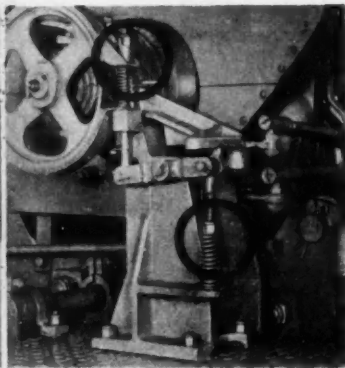
# For a nut that won't vibrate out of adjustment



**LOCKS ANYWHERE** . . . Spring-loaded reach rod and stop lever on this new General Excavator shovel depend on Elastic Stop Nut's positive gripping action. The elastic collar permanently positions the nut anywhere on the bolt to accurately maintain spring-loaded settings.

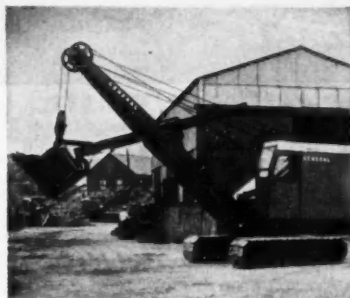
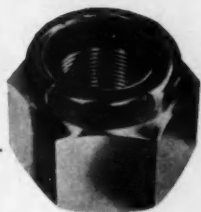


**VIBRATION-PROOF** . . . Idler tumbler on this new shovel must maintain constant tension against crawler belt. An Elastic Stop Nut holds it firm in the face of vibration and heavy impact loads. The Famous Red Elastic Collar hugs threads, damps out vibration.



**EASILY ADJUSTED** . . . On applications like these, General Excavator has provided its customers with the easy, sure method of adjustment—Elastic Stop Nuts. These nuts take hair-fine adjustment in the field or in the factory—and hold it indefinitely.

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This newest earth mover of the General Excavator Company is 100% equipped with Elastic Stop Nuts. At 750 key spots General Excavator simplified assembly with these standard fasteners—offers customers less maintenance, easier maintenance.

Elastic Stop Nuts are supplied with integral locking collars of nylon or fiber—permit multiple reuse—have military, naval, and air force approvals. For design information on Elastic Stop Nuts, contact your local ESNA representative, or mail the handy coupon to Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, N. J.

**Elastic Stop Nut Corporation of America**  
is also maker of the **ROLLPIN**



Dept. M3-95, Elastic Stop Nut Corporation of America  
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Please send me the following free information on ESNA self-locking fasteners:

- ☐ AN-ESNA conversion chart  
☐ Elastic Stop Nut Bulletin

- ☐ Rollpin bulletin and sample Rollpins  
☐ Here is a drawing of our product. What self-locking fastener would you suggest?

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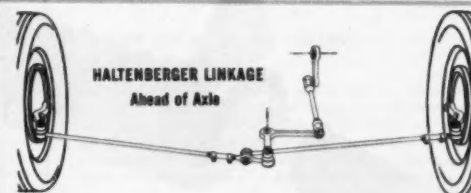
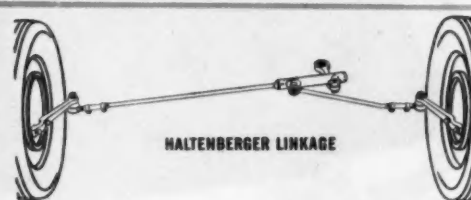
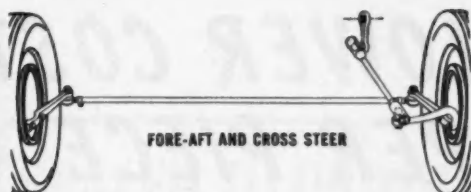
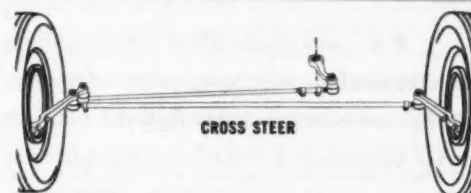
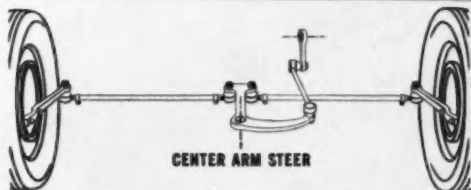
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**STEERING LINKAGE** must be developed to meet the requirements of many different car designs. Thompson's "steering engineers" have worked closely with car builders for over 35 years to improve steering.

With the accent on easy steering, car design advances, road speed and increased loads on suspension and linkage; steering linkage units are required to provide more strength and accuracy and greater freedom of movement at the sockets.

Improvements in modern automobiles—reduction of space due to front wheel brakes—redistribution of car weight by relocation of engines—increased movement of front wheels due to more efficient suspensions and precise location of linkage parts with relation to high point on the gear—necessitated better and far more complicated steering units.

Illustrated are 10 of the types of steering linkage found on current-model automobiles. They illustrate the variety of items produced by The Detroit Division of Thompson Products.

For consultation on these designs or other steering problems, please contact us.

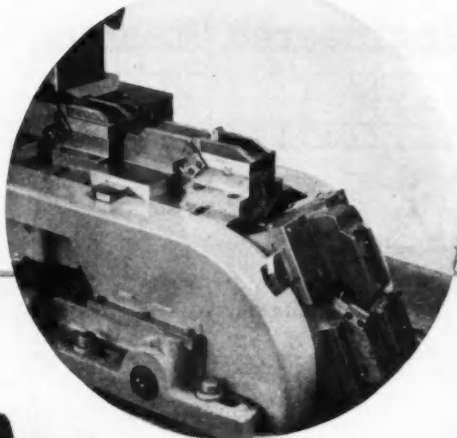
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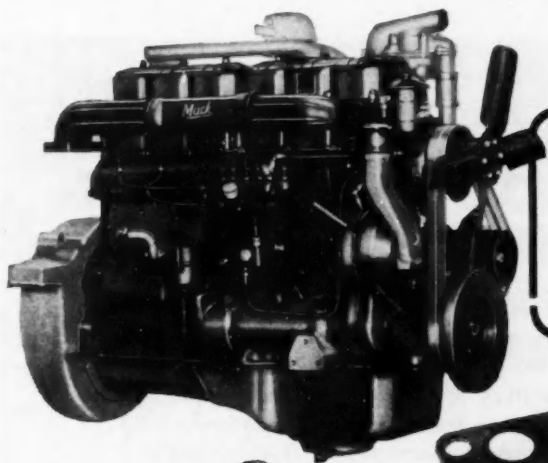
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# VICTOR

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SEALING PRODUCTS EXCLUSIVELY

# The Parking Puzzle and How It Is Being Solved

**P**RESENTED here is a summary of a survey prepared by the Automotive Safety Foundation for the National Retail Dry Goods Association. Corollary to this study is research being undertaken by the Highway Research Board into the fundamental questions of the effect of parking on retail trade property values. It is financed by the petroleum and automotive industries, through the Automotive Safety Foundation.

## Determination of Needs

**T**HE parking problem in a city likely will remain a vague, formidable thing until factual studies are made to break it down, to find out just what the needs are, specific areas of parking space shortages, availability of sites, and types of facilities required. Essential, too, is a picture of cost, of financing prospects, and of legal limitations.

Meeting parking needs often requires significant amounts of cash, and when cash is involved, as stated

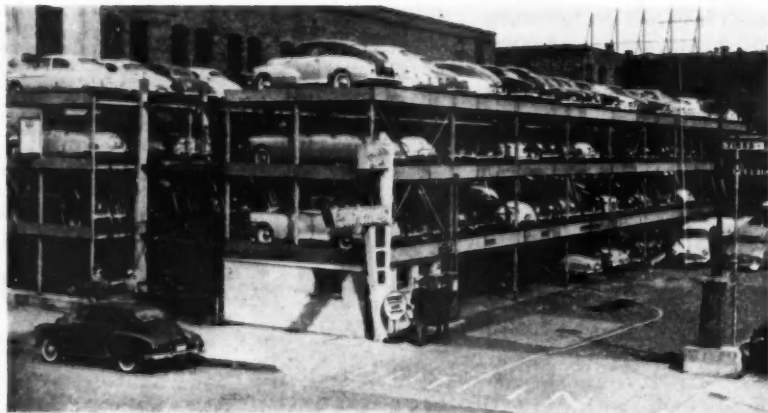
by one authority on investments, facts are a basic collateral.

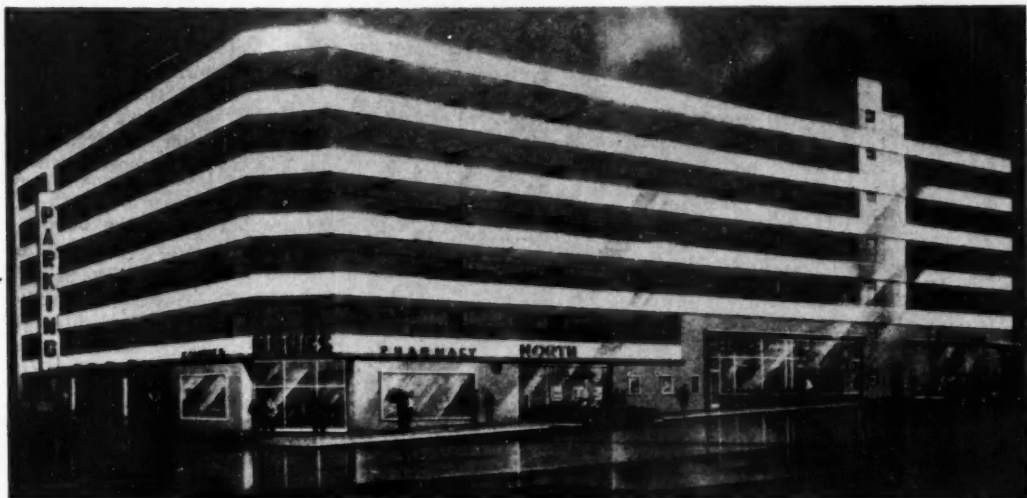
While usually studies are made primarily to determine municipal needs and programs, the facts have been useful to private operators in planning their facilities. In some cases cities have made special studies to determine desirable locations for private enterprise developments.

The dangers of guessing are demonstrated by events of the 1930's. Parking garages, often of unnecessarily costly design, were erected at poor locations, and so failed to make a fair return on the investment. Many were sold at huge losses or went into bankruptcy.

Recently a mid-western city had a study made of a parking project long under consideration. The project was for a garage over railroad tracks. The report probably saved the city considerable money, for it showed that the site was too far removed from the business center to

*By means of a hydraulic elevator 142 cars can be parked on this 55 by 142 ft site in Spokane, Wash. This pioneer installation of Pigeon Hole parking which was made late in 1950, provides moderate priced parking on a relatively small plot of land. The device consists of a mobile hydraulic elevator which travels the length of the parking structure, lifting cars to the desired level. Time to pick up and deliver a car varies from less than a minute to a minute and a half. Total cost of constructing the open-air garage and mobile elevator, plus office and rest rooms, was \$43,000.*





*This garage, with store space on the first floor, has a capacity of 699 cars and contains five stories with a floor area of 19,419 sq ft, including basement storage. Site cost was \$532,000 and building cost will be \$2,136,000. It is now under construction in Pittsburgh, Pa., as part of that city's parking program.*

attract a needed volume of parkers, and that the structure would be costly to erect, and therefore would not pay out on a revenue bond basis.

A recent study in California brought to light several municipal parking lots which, although attractively improved, were poorly patronized. They were found to be too far from important destinations, much farther than the two blocks engineers consider the maximum distance most shoppers will walk.

In attacking the parking problem the starting point is the engineering survey to determine needs.

Just how extensive the engineering survey should be, and how much money should be devoted to making it, are matters for each city to decide with regard to its size and the seriousness of the problem.

### Engineering Surveys

An approach, often used in smaller cities, has been for the municipality or businessmen to make a check of present facilities, designating on a map each facility and its capacity, with relation to principal destinations of people, and spotting available sites. Following this, checks have been made on the occupancy of the facilities, noting periods when lots are full and customers turned away. Also, sometimes included is a survey of curb parking to determine whether it should be restricted on busy streets because of its interference to moving traffic. Restrictions, of course, add to off-street needs.

Many cities have called in consulting engineers or firms to make more exhaustive and extensive studies. Others have utilized the service available through the state highway department wherein state and Federal highway planning survey funds, under the terms of the Federal Highway Aid Act, can be used to make studies, with the city sharing the cost.

### Can Set Up Joint Survey

The state-Federal-city parking survey includes determination of the parking demand by actual questioning of citizens through interviews and questionnaires in which starting points of car trips, destinations, purpose of trips, length of stay, and other vital matters are covered. At the same time, present facilities are studied with regard to their location, capacity, and effect on traffic movement.

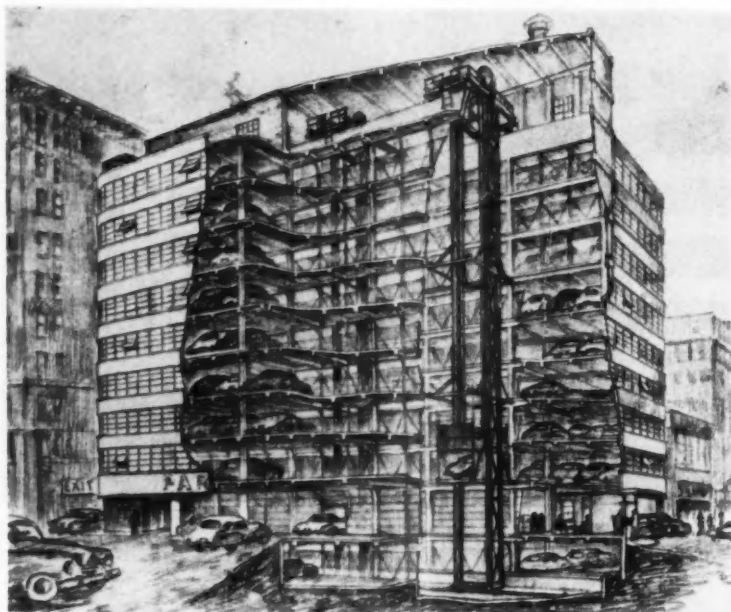
Such a survey provides the city with a wealth of information that can be analyzed to determine location and type of needed facilities—matters of vital importance from the standpoints of service and of financing. Another evident benefit is that factual data tend to eliminate local differences of opinion when parking programs are shaped up.

### Meeting All-Day Needs

Over-all studies also make clear the relative needs of short-time or customer parkers as opposed to those of all-day parkers. Unless adequate facilities for all-day parkers are provided they encroach on the more expensive facilities needed for customers, even though the all-day parkers want parking at lower cost and would be satisfied with space further from job locations.

When needs of all-day parkers are known, engineers believe it is possible to do a better planning, programming job for both types of parkers, with all-day parkers segregated so far as practical. This should reduce the total cost of a parking program.

Developing a municipal parking program, once the needs are set forth, requires financial and legal studies. A study of city finances, with the needs in mind, can lead to a determination of the best financing method



*Part-cutaway of a garage in Des Moines, Iowa, which has a combination elevator and crane device known as the Bowser System. Operation is as follows: With push button control, the attendant sits in the car. As the car is lifted vertically by the elevator, simultaneously the crane moves laterally to the proper tier. The attendant drives the car forward or backward to the space. Three such devices are used in the Des Moines garage, which is an enclosed structure to protect the equipment.*

for the particular city. This phase of study can go further afield — as was done in Kansas City, Kan., where decision to use the benefit district method was clinched when it was found that 70 per cent of the slum and undeveloped property in the business district, much of it suitable for parking, was tax delinquent and a drag on the city.

Legal studies likewise are essential. These should penetrate the city charter and ordinances as well as state laws to ascertain what the city can or cannot do. Many states still lack clear-cut laws which permit cities to use various financing methods. Many cities have had to carry their stories to state legislative halls to get the required enabling legislation.

### Borrowing

In the parking field private enterprise is finding a friendlier reception among investment firms than existed in earlier years. Since more facts are now available, and since efficient management practices have been developed, private operators have been able to obtain loans for parking ventures on approximately the same basis as for other commercial enterprises. Usually, however, the mortgage holder demands operation under high standards, likely requiring management by a professional parking firm or operator of proven ability.

In the municipal field, a leading financing method is the benefit district plan which requires bonding.

Generally, cities may obtain more favorable terms by issuing general obligation bonds, even though the actual funds come from benefited property owners.

### Revenue Bonds

Relatively new in parking is the municipal revenue bond, which may or may not be ultimately backed by the faith and credit of the city. In some cases revenue bonds are backed only by the earnings of the structures involved. Increasing attention, however, is being given revenue bonds, because of the more favorable reception from purchasers, which are not only payable from earnings of the lots or garages built, but also from revenues of curb parking meters. In at least eight states, cities are

empowered to consider all city parking facilities, both curb and off-street, as a system, with the revenues pooled. An advantage of this method is that if one off-street facility for some reason fails to pay its way, the combined earnings of all facilities may carry it.

### Additional Studies Required

The engineering, financial and legal studies covered earlier are those which are desirable to determine needs and to program construction. When revenue bonds are to be issued then supplementary studies must be made to satisfy the requirements of the investment houses and their potential customers.

Generally investment houses require that existing engineering facts on needs, site locations and kindred matters be reviewed and checked by competent outside engineers or consultants. Concerns doing this work usually extend the studies to financing, carefully considering the earning prospects of each unit to be financed. This involves traffic flows, traffic generators, business volume in the area and all matters which enable them to project potential revenues. Also, thorough study is given to maintenance and operating costs, and to the expected financing costs. The larger the margin between revenues and costs the more likely a city is to obtain rock bottom interest charges.

Services of architects and construction engineers, of course, must also be used to assure the bond buyers of sound, economical design. In some cities, much of

the structure design is done by city forces; however, outside review is normally required.

Legal studies are required to make certain that the project financing meets all state and local legal requirements, and to make sure that all agreements are in order. In some instances it has been necessary, in meeting bond house requirements, to institute friendly court cases to determine constitutionality of the program. This action is always required for first projects under new state law provisions.

Many cities have found it desirable to utilize the services of municipal finance consultants who, through their knowledge of the problem in general and of the bond market in particular, can obtain the most favorable borrowing terms. They are helpful in guiding the preparation of a prospectus.

### Prospectus Requirements

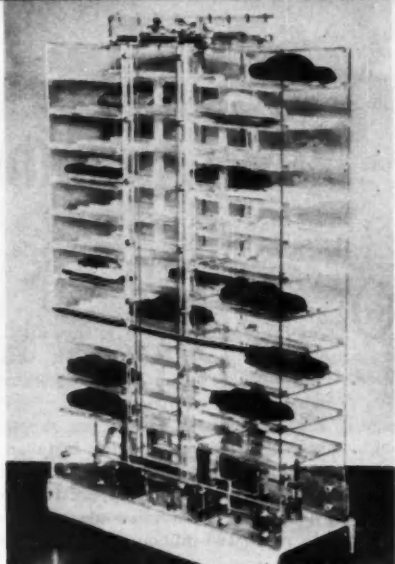
Generally in bond financing it is necessary to issue a complete prospectus, which plainly sets forth all facts usually asked by bond buyers.

The prospectus may be simple in form or a more elaborate sales piece, with the decision based on the size of the issue and whether buyers are to be primarily local or those in distant communities.

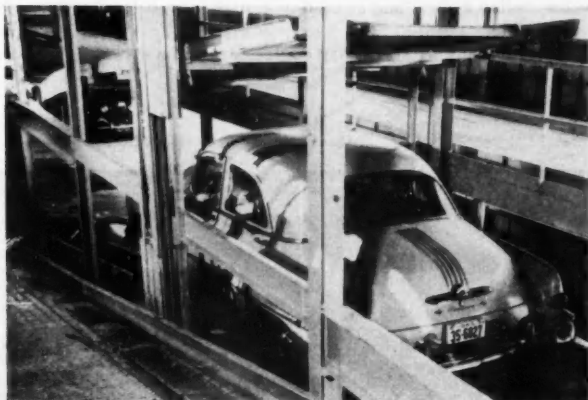
A typical prospectus is that published late in 1951 by Royal Oak, Mich., to arouse interest in its \$325,000 revenue bond issue. A binder was issued which contains 24 pages of text, tables, maps and photographs, an insert of a copy of the ordinance authorizing the issue, and a large folded map of the central business district with a diagram indicating parking deficiencies. An added feature is the reverse side of the map which is covered by an airview of the city and surrounding area. The binder contains a full statement on terms of the issue, and on engineering, legal and financial aspects of the project, including commercial and financial background of the city even though the bonds were not of general obligation.

Grand Rapids, in floating its \$800,000

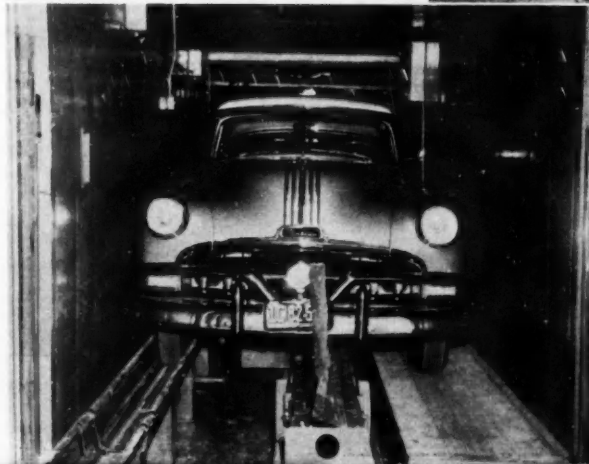
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An automatic mechanical parking garage which will feature use of most of its elevator space for parking, is scheduled for early erection in Detroit. Backed by private capital, the first unit will be built on city-owned land. If it proves successful, two additional units will be added. The city then will purchase all three. The simplified scale model of the automatic car storage device indicates how elevator cages carry cars up and down, and across at the top and bottom, in the double-size elevator shaft. The unit to be installed in Detroit will have space for eight cars on each floor instead of the four shown in this model.



The Beverly Medical Center, in Beverly Hills, Calif., has erected the first dismantlable parking structure to be built. Known as the Multi-Deck, it is designed for quick construction and it is said that the structure can be dismantled and moved to another site in a few weeks. Shown here is one of the tilting ramps inside the Beverly Hills Garage which can be tilted up or down. The ramps can be used also as part of the floor, permitting moving of cars from one side of the structure to another.



On a space 25 ft by 67 ft the Park-O-Mat parking garage in Washington accommodates 72 cars—the first installation of a completely automatic parking device. Two elevator units, each equipped with a car positioner, operate side by side. While each unit can serve 25 floors, this installation was confined to 16 floors above and two floors below ground. Shown here is the car positioner which automatically deposits a car, either in front of or to the rear of the elevator, at the designated floor. The elevator then returns automatically to the ground floor. Only three attendants are employed, one for each of three shifts. Daytime rates are 20¢ for the first half hour, 20¢ for the next half hour, and 15¢ per hour thereafter.



# New Aluminum Plant Powered by

**O**NE of the world's most extensive applications of industrial engines is being made at the Reynolds Metals Company's new San Patricio aluminum reduction plant near Corpus Christi, Texas. Taking advantage of readily available natural gas supplies, 83 gas engines with generators are being installed there for the purpose of supplying all the necessary electricity for the operation. It will have an electric power capacity of 175,000 kw. Production at the new plant is expected to reach 160 million lb of aluminum pig per year.

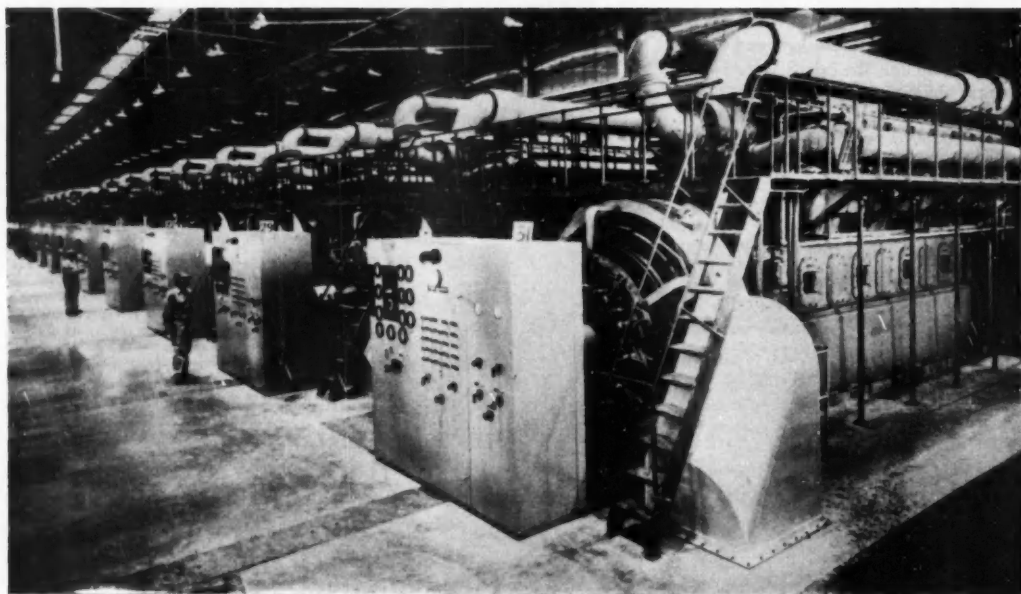
Of the 83 gas engines, 42 engines are Cooper-Bessemer units, type LSV-16. These 16 cyl turbo-charged, four-stroke "V" type engines are rated at 3700 hp at 327 rpm, and are direct connected to 2500 kw d-c or a-c generators. Most of the engines are used for driving the d-c generators. The engines are of spark-ignition type and are started on air at 250 psi. Each engine utilizes a supercharger with an aircooler to pre-cool the air entering the engine. A separate water cooling system and aircooling system is used for each engine.

The remaining 41 stationary engines are to be sup-

plied by the Cleveland Diesel Engine Div. of General Motors Corp. These Model 16-358X units drive 2000 kw d-c generators. It is of interest that this will be the first installation of this model. The engines are rated at 2850 hp each at 600 rpm and are of the 16 cyl two-stroke radial type, four bank design, with spark ignition. They are started electrically by current supplied to their generators from other units. Air filters are fitted, but no air-coolers are provided. Separate centrifugal superchargers are utilized on each installation. The engines are mounted vertically with the generators located on a separate floor below the engines.

Fuel gas is brought into each of the engine buildings from the common plant system at a pressure of 100 psi. It is delivered to each engine at the longitudinal plant headers, and is taken through a gas pressure reducing valve to reduce it to a pressure of about 19 psi for the individual engine. The gas passes from the pressure regulator through a gas expansion tank which has sufficient volume to smooth out impulses in the gas supply to the engine itself. Air filters of the oil bath type are used for engine intake air.

*Shown here are 16 of the 31 Cooper Bessemer 16 cyl natural gas engines.*



# 83 Gas Engines

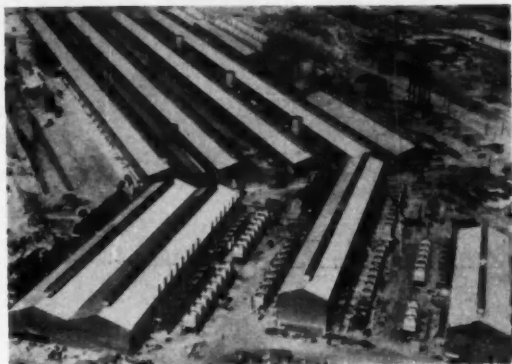
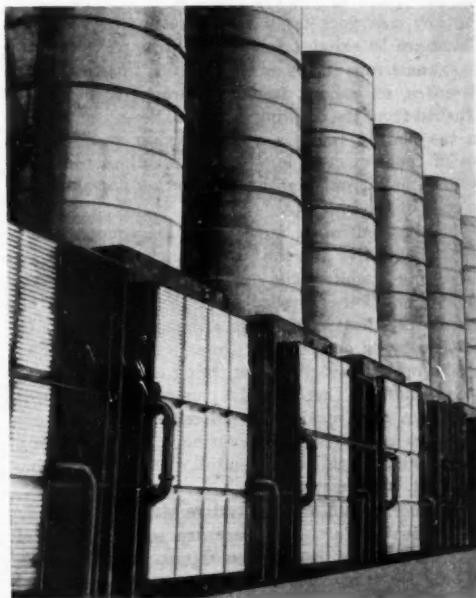
One of the problems in the installation of the engines was the great amount of heat that had to be dissipated. This is on the order of 550 million Btu per hr. For this particular job Young Radiator Co. was chosen to supply units to cool engine jacket water and lubricating oil.

Young supplied the entire assembly for the engine cooling systems—lube oil cooling coils, jacket water cooling coils, water manifolds, fans, fan shrouds, fan support tripods, fan shafts, fan shaft bearings and couplings, gear boxes, and electric space heaters in the plenum chambers to prevent freezing. Each component has been designed to withstand the force of 125 mph winds. All units are designed for operation at 100 psig, and all coils are tested at 200 psig.

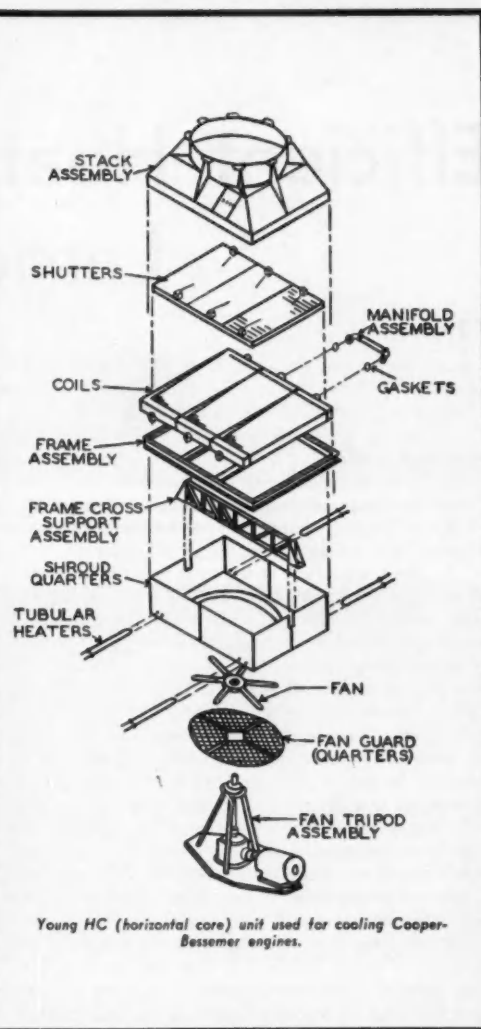
For the Cooper-Bessemer engines, horizontal cores, called HC units, were used. Each unit has two water cooling coils, one pass, with  $\frac{5}{8}$  in. OD by 0.035 in. tubes rolled into the steel tank, and aluminum fins. Water and oil tanks are of fabricated steel. The finned face dimensions of

(Turn to page 96, please)

These stacks represent the VAD (vertical air discharge) cooling units for the GM gas engines.



Airview of the new San Patricio plant, Reynolds Metals Co.



Young HC (horizontal core) unit used for cooling Cooper-Bessemer engines.



*View of the battery of 22 pit type gas carburizing furnaces installed in the heat treating department. Twenty of these furnaces are provided with cooling pits while 13 units are specially equipped for controlling carbon content of the carburized case.*

## Efficient Heat Treating of Large Transmission

**T**HE heat treat department in the Transmissions Operations of the Allison Division, General Motors Corp., was planned with these factors in mind:

- (1) Giving employees the most desirable working conditions possible.
- (2) Providing flexibility of operations.
- (3) Avoiding unnecessary movement of material.
- (4) Arranging equipment to maintain "good house-keeping" and a high percentage of efficiency.
- (5) More important at the time was the utilization of every inch of available floor space, which, as with other manufacturers confronted with the problem of commercial and defense production, was at a premium.

As an example of space saving, it is of interest to note that in an area 44 ft by 77 ft there are 22 Homo-Carb furnaces (25 by 36 in. and 25 by 48 in.), one Homo-Draw furnace, 18 slow cooling pits, one 60-in. oil quench, one 50-in. water quench, and one five by seven ft degreaser. Also included in this area are the instrument and Micro-Carb controls for the furnaces.

To avoid unnecessary movement of material, the heat treat department is divided into two main sections each of which are entirely walled. This was done to prevent overloading of the air conditioner for the plant. One section, which is referred to as "normalize," is located near the receiving dock to minimize the handling of rough forgings as they are received. The other section is centrally located in the plant to minimize handling of machined parts to be heat treated.

The two sections maintain their own air conditioning, which includes complete air conditioning for the heat treat basement. Because of the vast amount of air movement in the basement, it is now impossible for any gas pockets to form causing an explosion. There are 54 exhaust fans in the heat treat area and 20 exhaust fans in the normalize area, thus permitting all gases, oil vapors, fumes and excessive heat to be expelled from the building quickly. The exhaust system in the plating room is a complete air wash system, which removes cyanide, acid and alkalines before expelling the air outside, thus preventing damage to the outside of the building.

Positive control of quenching oil is maintained to insure repetitive and uniform die quenching and free quenching results. The quenching system contains 25,000 gal of oil controlled at  $110\text{ F} \pm 3\text{ F}$ . It is composed of five heat exchangers with a capacity of 2,375,000 Btu based on a cooling tower water inlet of 85 F and an outlet of 95 F, oil returning at 140 F and supplied at 110 F. There are five pumps, each having its own filter, thus making a total capacity of 2500 gpm at a pressure of 65 lb, delivering a line pressure of 40 lb. To handle this volume of oil, the two return lines are 24 in. in diameter.

To generate sufficient protective atmosphere gas for the hardening furnaces, there are seven 3000 cu ft endo gas electric heated generators, banked side by side to conserve floor space. The gas is then mani-

**By E. R. Peterson**

Superintendent,  
Heat Treat Transmission Operations  
Allison Div., General Motors Corp.  
Speedway, Ind.

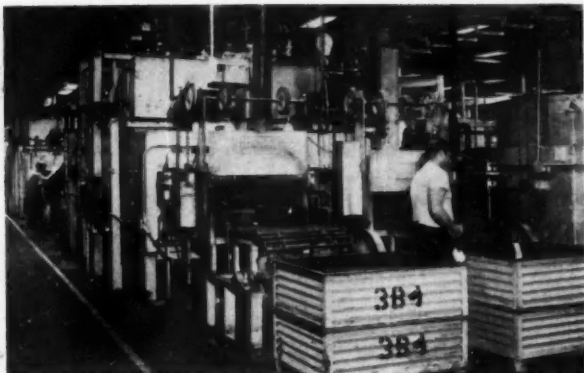
## Parts

folded and supplied to the various hardening furnaces. To maintain quality control and insure against any possibility of decarbonization in the hardening process, an hourly check of the dew point of the gas is maintained, plus constant analysis of the gas.

Generators are equipped with automatic burn outs. The burn-out gas is automatically expelled to the outside to prevent any contamination of gases in the manifold. The manufactured endo gas is made from propane, piped in from a tank outside the building.

Back tracking of material movement has been held to a minimum through the straight line production principal. Parts can be delivered from manufacturing to the necessary heat treat furnaces without interrupting the flow of other work. A reduction of manpower and improved quality control has been accomplished through the straight line flow of material. Throughout the department, spotted at various locations, is testing equipment such as hardness testers, plug gages, micrometers, thickness gages, microscopes, etc.

Adjacent to the heat treat is a mod-



Two units of a battery of eight Lindberg continuous draw furnaces are shown here. These furnaces are capable of producing 1000 lb per hr on an average three-hour cycle. Temperature ranges from 300 to 1400 F.



Because of the large size and mass of the gears used in the Allison transmission, control of heat distortion becomes a major problem. Here is a partial view of the battery of 20 of the latest type Gleason die quenching machines used in quenching such gears.



Here is a battery of seven Electric Furnace Co. rotary hardening furnaces used in conjunction with the Gleason die quenching equipment. Temperatures vary from 1400 to 1500 F.



Each of these five Westinghouse continuous controlled atmosphere hardening furnaces is capable of handling 500 lb per hr at approximately 1550 F.

ern plating room. One of the first things noticed is the absence of bus bars running across the room. All rectifiers are supported from the ceiling above the tanks they serve, thus eliminating excessive bus bar runs. Cleanliness and order are pronounced in the plating room. The several types of plating done are copper, zinc, tin, anodize, granodize and hard chrome. Most of the work is in copper. The copper line has two large semi-automatic plating units. The hard chrome tank consists of five stations independently controlled.

The carburizing area consists of two continuous gas carburizing furnaces and 22 pit-type batch gas carburizing furnaces; 13 of these units contain controls for determining the carbon content of the case. Based upon information gathered on the carburizing of boron steels, the control of carbon potentialities in the carburizing cycle is of utmost importance.

At the present, Allison is conducting experimental research on the use of propane gas in the carbon-controlled furnaces. The problem of controlling and measuring the propane gas before it enters the carburizing furnaces has been overcome. Tests to date on production loads have shown very satisfactory results, not only in uniform quality of the case but also in the great difference of cost between using a liquid carburizing fluid and that of the propane gas.

Next in line from the carburizing area is the free-

quench hardening section. This area contains five continuous, semi-automatic, atmosphered controlled hardening furnaces with a total capacity of 3500 lb per hr. Also in this area are two pit type nitriding furnaces, three induction units and a welding booth in which special alloy racks or fixtures for heat treat processing are made and repaired.

Farther down the line is a continuous salt mar-temper unit capable of 800 lb per hr. This salt unit is entirely enclosed and has its own exhaust system including air conditioning.

Across from this room are eight large atmosphere-controlled, electrically heated, rotary hardening furnaces used entirely for die quenching of gears and special rings and parts. There are two die-quenching presses used for this purpose.

Next to this line are two lines of continuous draw furnaces. There are eight continuous draw furnaces, each with a capacity of 1000 lb per hr, with a maximum temperature of 1400 F.

Directly in line with the draw furnaces are six tableblast units and one rubber belt tumblast for cleaning operations. From here work flows through the inspection department.

Electrical and mechanical maintenance cribs are maintained to insure against any long delays on repair work or breakdowns.

### Competition Announced For Design Award

A new competition for designers, engineers and manufacturers of machinery of all types has been announced by the James F. Lincoln Arc Welding Foundation of Cleveland, O. The program offers \$30,000 in 101

cash awards for the best papers describing the mechanical design and construction of any type of machine or machine component which is designed for arc welded steel fabrication.

Any machine or component whose performance or appearance has been

improved, or whose cost has been reduced, through the use of arc welding can be described. Papers will be judged by a jury selected from men prominent in industry and education. The program closes July 27, 1953. The rules and conditions brochure is available from the Lincoln Foundation, Cleveland 17, O.



# Steel Panels for Trucks

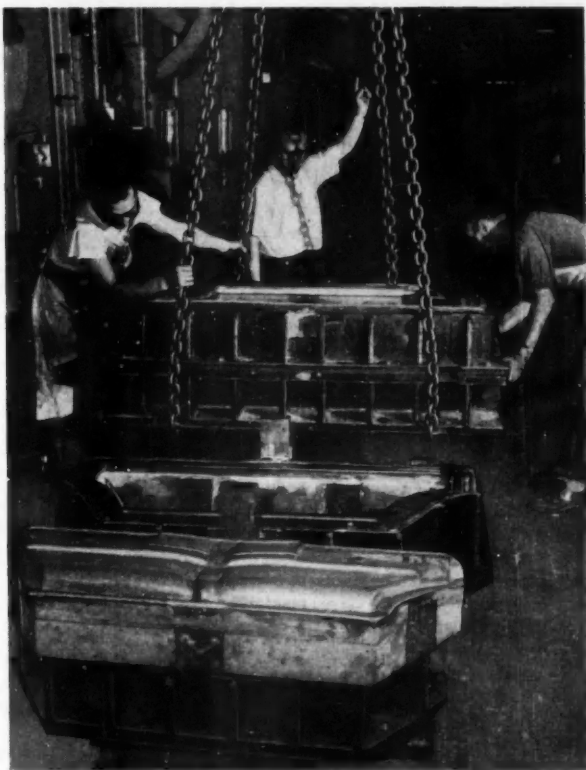
## made in Plastic Die

A DIE made of plastic material instead of steel is being used by Chrysler Corp. in factory production to shape major steel panels for Dodge trucks. Production tests are being conducted at the company's Nine Mile Press Plant in Detroit, where a standard 100-ton press, with a draw die made of plastic, already has turned out several hundred steel cowl panels for the Dodge Truck Division.

Plastic comprising the experimental production die weighs less than 1500 lb, compared with 6000 lb of steel required for the customary die.

The plastic used in the casting of the dies is Tool-Plastic, supplied by Rezolin, Inc. It is a thermosetting liquid phenolic material which had previously been used successfully by the aircraft industry to stamp some aluminum and stainless steel airplane parts. Because of the high impact resistance required of a die in forming steel, it was necessary to place the plastic die in a box made of boiler plate.

One half of the plastic die was formed by pouring cold liquid plastic into a plaster mold of the truck cowl side panel. After being coated with wax to simulate the thickness of the finished steel piece, this same mold was used to cast the second half of the die. Hardening



*After an experimental production run the Tool Plastic die is opened for inspection. In foreground is shown the plastic punch of the die; in the middle is the lower half of the die, and in the background the upper half is being lowered to the floor.*

of the die was accomplished through its own chemical reaction, and curing required less than 24 hours' exposure to the heat from infra-red lamps.

Besides a saving in initial die cost, use of plastic dies promises an economy in time for certain production operations. For example, the test die was produced in less than three weeks, compared with 14 to 16 weeks normally required to make a comparable steel die. No machining of the die was required after it was formed.

THE ARTIST'S CONCEPTION OF THE AIRPLANE OF TOMORROW depicted in Fig. 1 has glass wings, glass ailerons, glass stabilizers and an all-glass fuselage. It is fastened with glass rivets and supported by titanium and stainless steel low-density structural members. Its fuel has a lower vapor pressure than any fuel known today. It is lubricated with a dry, heat-resistant metal powder. It could be fabricated more easily and at lower cost than present aircraft. Its new powerplant may be capable of thrusting the plane through the air at more than 2000 mph.

By Thomas E. Piper

Director of Materials and Process Engineering  
Northrop Aircraft, Inc., Hawthorne, Calif.

THIS aircraft is not just an artist's fantasy. It must be built if airplanes are to fly successfully at two or three times acoustic velocity. But what materials are they to be made of? How are they to be fastened together? How can such aircraft negotiate the "heat barrier" which causes the mechanical properties of present aluminum and magnesium alloys to be lowered at extreme velocities?

The so-called "heat-barrier" for high-speed aircraft results from the ram-compression temperature rise on the skin surface over which the air passes. This temperature increase is the result of a transformation of the kinetic energy of the moving body into heat energy. The temperature rise is directly proportional to the square of the supersonic velocity.

Many military fighters such as the F-89 Scorpion now in production at the plants of Northrop Aircraft, Inc., Hawthorne, Calif., have maximum speeds approaching or surpassing acoustic velocity. The speed of sound varies with altitude, decreasing from 760 miles per hour at sea level to about 675 miles per hour at 30,000 ft. Ram temperature rises for these speeds are on the order of 70 to 90 F. In order to determine the maximum temperature to which the localized high friction areas on the surface of a plane flying at a given speed might be exposed, the ram temperature rise for that speed must be added to the atmospheric

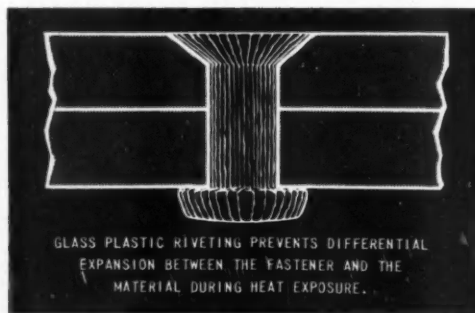
## New Materials Forms Required for High

temperature in which the plane happens to be flying.

On a standard United States Air Force summer day the temperature at sea level is taken as 100 F. As shown in Fig. 2, this temperature decreases with altitude up to 46,500 ft; after which it is assumed to remain constant. The kinetic temperature increase for a speed of 760 miles per hour is about 88 F. The maximum surface temperature to be expected on a plane flying under these conditions is, therefore, about 188 F. This is one of the reasons why it is necessary to cool the interior of an aircraft like the F-89 in order to maintain comfortable conditions for the occupants. Special refrigerating equipment is installed for this purpose.

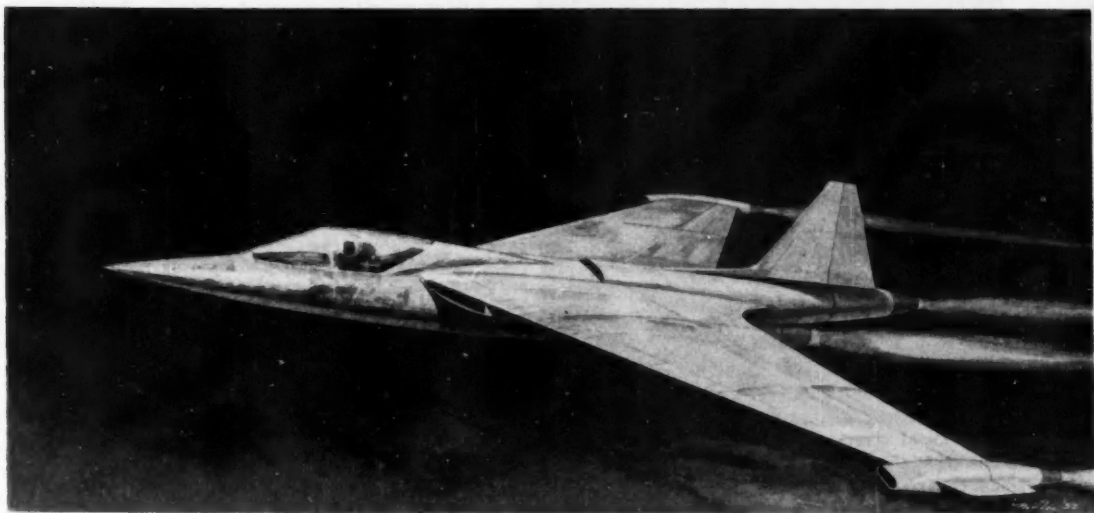
Ram temperature rises encountered in the transonic range (500 to 800 mph) have not proved excessive for the light-metal alloys used in present aircraft. But as flying speeds increase, new materials will be required. At 1300 mph the ram temperature rise goes up to about 260 F. At 2600 mph, this increase goes to slightly more than 1000 F. That such temperatures are not unrealistic is indicated by the fact that the Germans recorded surface temperatures exceeding 1500 F on the V-2 rocket. Furthermore, it has been calculated that the average meteor, upon entering the earth's atmosphere at a speed of 20 miles per

FIG. 5



Glass plastic rivet with unidirectional fibers.

FIG. 1



Artist's conception of an "all glass" airplane built from heat-resistant materials to withstand the high temperatures encountered at speeds up to three times that of sound.

## Speed Planes of the Future

second, will create a ram air temperature of 5432 F.

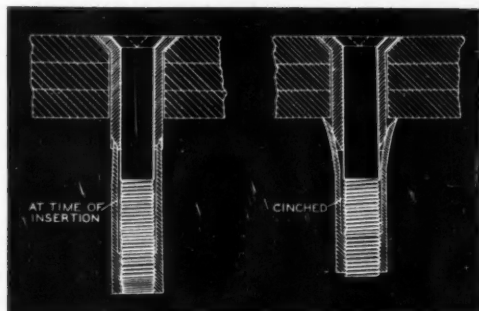
Figure 3 shows the relation between surface temperature and airspeed at various altitudes on a USAF summer day. For the purpose of this graph, it is assumed that the ram temperature rise for a given airspeed is constant at all altitudes. Points plotted on each curve were determined by adding the kinetic tem-

perature increase for the given airspeed to the ambient temperature at that altitude. Fig. 3 appears on page 45.

From this it can be seen that the high-speed combat plane of the near future must be built of something other than conventional light-metal alloys. At temperatures above 300 F, the mechanical properties of the commonly used aluminum and magnesium alloys are materially lowered. At room temperature the tensile strength of the best heat-resistant aluminum alloy (24S-T) is 62,000 psi. After 100 hours at 500 F the strength of 24S-T drops to 18,000 psi. In other words, the strength of this alloy at 500 F is about 30 per cent of its value at room temperature. For 75S-T aluminum alloy, a great deal of which is used in the Northrop F-89, this loss amounts to almost 80 per cent.

Before turning to a discussion of the new material forms which will be needed to solve the speed-temperature problem, it must be emphasized that both the Aluminum Co. of America and the Dow Chemical Co. are known to be working vigorously to overcome the limitations of their products in this respect. Recent Dow experiments with alloys of magnesium and the rare-earth elements indicate that these alloys may maintain good tensile properties at temperatures well in excess of 300 F. Alcoa's search for an adequate sub-

FIG. 6



The Northrop removable blind fastener.

stitute for 24S-T also is reported to have met with "limited" success.

At present glass-plastic laminates appear to offer considerable promise of giving good service at high speeds. For use in future aircraft, woven glass fabric can be laminated with temperature-resistant materials such as phenolic resins or silicones. The resulting structure has a favorable strength-weight ratio and maintains a high percentage of its strength at temperatures in the vicinity of 500 F. For instance, phenolic-resin-impregnated, glass-fabric laminate, having a tensile strength of 80,000 psi at room temperature, experiences little or no loss in mechanical properties at 300 F and maintains a strength of 35,000 psi after an exposure of 100 hours at 500 F.

Another advantage of this molded material is that it has a lower coefficient of expansion than a metal structure. This means that localized dimensional changes produced by differential exposure to heat will be less severe than in metal aircraft. The result will be less localized expansion producing structural warpage and the elimination of other aeroelastic variations which could damage the airplane and establish critical control problem. This is due not only to the low heat-transfer properties of the molded laminated structure but also to the fact that it is integrated with like materials possessing uniform coefficients of expansion instead of dissimilar metals having different coefficients.

Flexibility may be somewhat greater with glass-plastic materials than with metals; but the designers can often make favorable use of this property. Moreover, simplified tooling will greatly lower production costs. It is quite conceivable that an entire airframe could be molded from plastics in four or five basic molds, with only a handful of skilled workers required for the operation.

British airframe manufacturers have fabricated a set of glass-plastic wings which will be flight tested in about six months. American producers believe that extensive structural use can be made of glass-plastic materials. A complete military combat-type airframe designed specifically for glass-plastic materials and manufacturing methods is considered entirely within the realm of possibility. Increased aerodynamic smoothness would be achieved through elimination of

rivets, screws, and skin joints. Each molded surface produced would have the same contour as each preceding part. The cost of designing and producing a full-size airframe from glass-plastic should not be proportionately greater than for a smaller size model.

Recent developments in the phenolic resin field indicate the possibility of plastic laminates with improved properties. If these materials demonstrate the hoped-for physical and mechanical properties at elevated temperatures, airplanes capable of withstanding the skin friction above sonic speed may be constructed in

FIG. 4



*Hot-box for tensile tests at elevated temperatures. The test coupon of phenolic resin impregnated glass-fabric laminate will maintain a strength of 35,000 psi after an exposure of 100 hours at 500 F.*

the not-far-distant future. To accomplish this, a vigorous, all-out program of research must be pressed forward. New materials must be developed. New processes must be contrived. Many tests must be run. Shown in Fig. 4 is a Northrop-built "hot-box" specially designed for tensile tests at elevated temperatures. In the box is a test coupon of phenolic-resin-impregnated, glass-fabric laminate—the best material yet known for the aircraft of 1957.

The glass rivets in plastic structures as shown in the futuristic aircraft in Fig. 1 are still a trifle farther away than just around the corner. If research looking toward their development is eventually successful, they

will probably consist of glass roving having unidirectional fibers impregnated with silicones or phenolic resins. They would presumably exhibit superior fatigue strength because of the resilience of the material. More important, during exposure to elevated temperatures, there would be no differential expansion between the fastener and the material being joined. Experimental glass rivets of the type shown in Fig. 5 have thus far, however, proved unsatisfactory in Northrop tests. A more realistic possibility is the early development of a titanium version of the Northrop removable blind fastener shown in Fig. 6. This new joining device may effect large savings in production and design time. It may be substituted for AN bolts and nuts where strength requirements permit.

Next to glass-plastic among materials for the future stands titanium. Despite disappointments for those who were too swift in proclaiming it the "glamour metal," titanium now is winning sound, unemotional recognition. Its importance as a load-carrying member in future airframes seems unquestionable. Titanium's admirable strength-weight ratio and its ability to withstand corrosive attack at high temperatures are well known. And its alloys offer good heat resistance.

Another advantage of titanium is its high fatigue strength when exposed to dynamic fatigue factors—for example, a structural member exposed simultaneously to resonance set up by high-powered engines and to the effects of high-velocity air currents. Titanium also has the ability to resist dynamic creep, that is, the creeping of metal under co-existing stresses, such as a structural part exposed simultaneously to tension and compression or to tension and torsion.

It seems likely that the high initial cost of titanium will soon be lowered. At present the cost of titanium alloys delivered in reasonable quantities is about \$20 per lb. At least one authority believes that this will be reduced to \$6 per lb within the next two years. Titanium is the fourth most abundant structural metal in the earth's crust; rich, workable ore deposits have recently been discovered both in Canada and in the United States.

Properly adapted to high-speed operation, steel probably stands next to glass-plastic and titanium as the airframe material of the future. Northrop Aircraft, Inc., has already pioneered extensively in applying steel castings to airframes. During World War II the Northrop-built P-61 Black Widow contained more castings than any other fighter. None of these castings are known to have failed in service.

It is true that low-speed stainless-steel airplanes have been successfully built and flown; but weight, of course, is the great drawback to the widespread use of present forms of steel in high-speed airframes where stiffness and rigidity are prime factors. Before stainless steel or titanium alloys can be successful for the design and fabrication of high-speed aircraft, much research, structural and manufacturing development must be carried on in an effort to produce low-density, high-strength, rigid metal structures of these alloys. A promising potentiality is stainless steel honeycomb, which is now being experimentally produced by several American companies. This is a light-weight core ma-

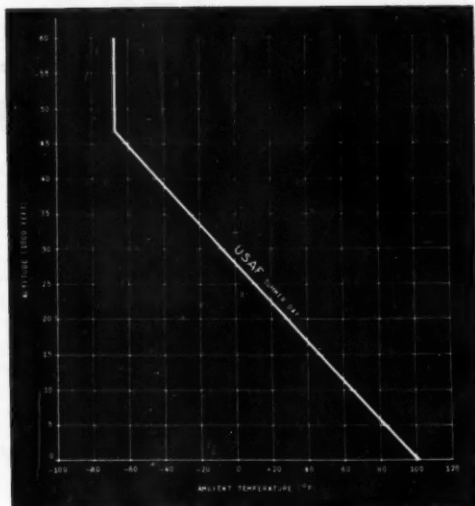


FIG. 2

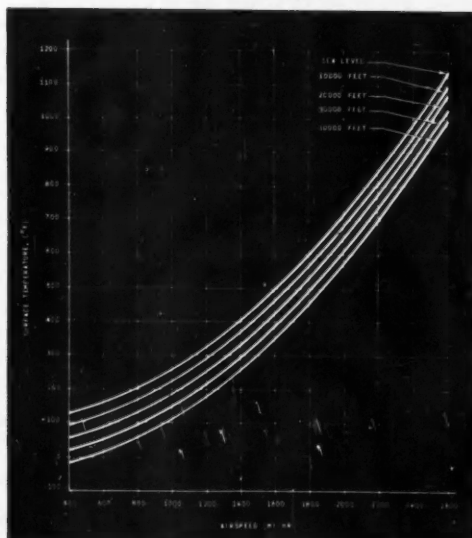
Ambient temperature versus altitude.

terial possessed of great heat resistance, high rigidity, and remarkably low density; more than 80 per cent of the volume of a conventional honeycomb structure consists of the hexagonal air spaces. Other possibilities in this field are light-weight steel and titanium extrusions. Such structural members are shown in Fig. 1.

(Turn to page 114, please)

FIG. 3

Surface temperature versus airspeed for various altitudes USAF summer day.





# The SAE West Coast

**R**EVIEW of truck maintenance practices and evaluation of some new powerplants were presented at the SAE National West Coast Meeting last month at San Francisco. Technical men of the automotive, petroleum, and other industries considered the next step in powerplants, power steering, air filters, trailer design, and lubrication problems, among many other subjects. Three papers of interest to the industry are abstracted here, dealing with liquid petroleum gas, power steering for trucks, and tractor-trailer requirements in design.

## Engine Performance With LPG

By J. E. GLIDEWELL  
Hall-Scott Motor Div.  
ACF-Brill Motors Co.

**S**INCE propane has a higher octane rating than butane, a higher compression ratio can be used with propane which, other things being equal, should result in increased power output and improved fuel economy. The higher compression ratios, however, cannot be safely used unless it is assured that the fuel supply will be propane and not a mixture having a lower octane number rating.

An alternative, of course, is to have an engine with a compression ratio and spark advance suitable for about a 60-40 butane-propane, so that a wider range of LPG fuels can be used. This procedure is recommended particularly if, as in the case of truck use over long distances, fuel must be purchased at various sources. However, such procedure will not produce optimum fuel mileage.

Butane, commercial mixture, has a spark tolerance curve similar to gasoline in that the spark can be advanced with increasing engine rpm. Propane on the other hand tends toward a high-speed knock or ping rather than low speed; in other words, it may be found, depending on compression ratio, etc., that propane can have more spark advance at lower speeds than in the high speed range. Propylene is a constituent of LPG very similar to propane and exhibiting a

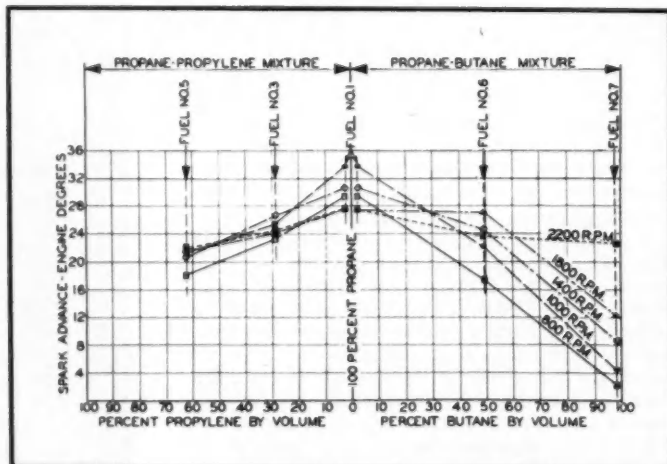
similar spark tolerance characteristic. This constituent is not usually found in very large percentage in LPG as marketed in the West, although it may comprise 50 per cent or better of LPG sold in the East. At the same compression ratio, propylene exhibits

a greater tendency toward high speed knock than propane. Reference to Fig. 1 will indicate the trend in relative spark advance characteristics. Data for this series of spark advance curves were obtained from test stand results on a six cyl 779 cu in. displacement Hall-Scott bus engine with an 8.25 compression ratio. These results indicate trends, although they are not claimed to be entirely comprehensive since only one compression ratio was used.

When using higher compression ratios with LPG, higher outputs and higher combustion chamber temperatures can be expected and it is considered advisable to use exhaust valves and seat inserts faced with a hard material and top piston rings with chrome face.

Since LPG enters the engine cyl-

FIG. 1



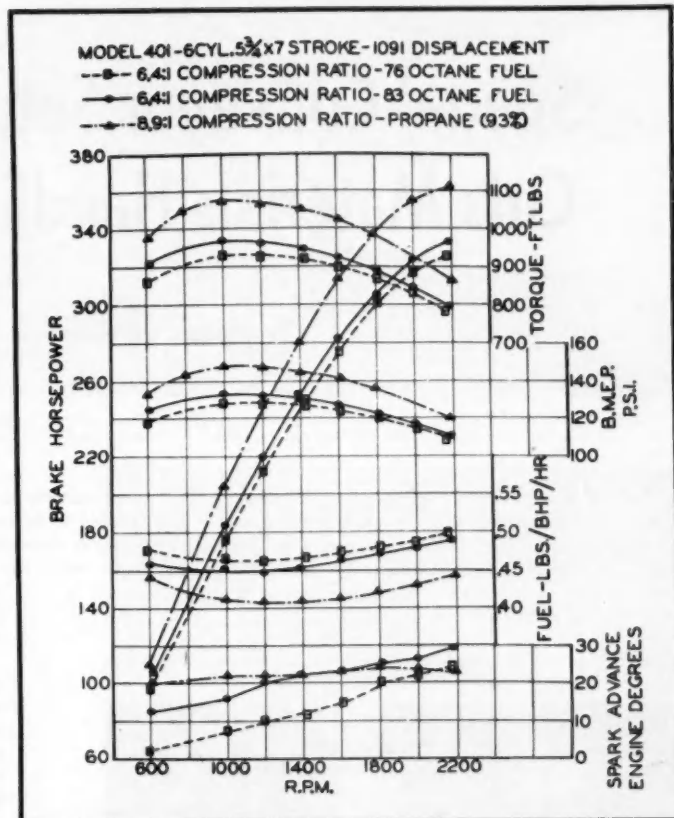
Trace knock comparison of LPG fuels propane-propylene versus propane-butane mixtures are depicted in this graph. A Hall-Scott six cyl 779 cu in. displacement engine with an 8.25 to 1 ratio was used.

# Meeting

inder as a dry gas, no intake hot spot is required. In fact, every effort should be made to separate the intake and exhaust manifolds so that the intake charge cannot be heated. Running a cold intake manifold improves volumetric efficiency and hence engine output. Also, since distribution with a dry gas is not the problem that it is with vaporized fuel, the intake manifold can be somewhat larger in cross-section thus further improving volumetric efficiency.

Figure 2 shows performance curves of a six cyl Hall-Scott truck engine comparing gasoline and LPG output. These curves serve to indicate increased performance that can be expected. All runs were on stripped engine. Note that specific fuel consumption is much lower on propane, but specific consumption is in pounds and not in gallons. Checking specific consumption against specific gravity, propane would need to sell at approximately three-quarters the cost of gasoline in order to equalize cost of fuel per mile. (See p. 42 of Feb. 15, 1951, AUTOMOTIVE INDUSTRIES.)

FIG. 2



This is a performance curve of a six-cyl engine using LPG and gasoline at various compression ratios.

## Tractor-Trailer Design Requirements

By W. P. DAVIS

Associated Transport, Inc.

**A** TREMENDOUS, potential volume of traffic is available to our industry, which has not heretofore been encouraged because of its light and bulky nature. In view of these circumstances, it is important that we increase the cubic capacity of our vehicles. The trucking industry could standardize on a 35 ft semi-trailer, except for the fact that few manufacturers today offer an adequate tractor which will accommodate a 35 ft trailer in states where tractor-semi-trailer length restrictions are 45 ft.

In reviewing various makes of trucks and truck-tractors, we find there is considerable wasted space built into them. For example, the space between the radiator core and the radiator grille, and more space between the grille and the front bumper. We recommend that in conventional type tractors the front-of-bumper to back-of-cab dimension not be in excess of 102 in.

Obtaining increased cubic capacity at the present time is also limited by the variation in unladen fifth wheel height of tractors. To permit trailer

manufacturers to give us more cubic capacity, it is recommended that the manufacturers design their tractors so that the unladen fifth-wheel height is at a maximum of 48 in. In addition to this, the distance from the top of tires to the floor of trailers should be kept at a minimum by improving the placement or type of springs.

To facilitate the interchange of equipment, we also recommend that king pins be set 36 in. from the front of the trailer. Landing gears on trailers 30 ft and over in length should be located 80 in. back of the king pin, thus allowing the use of tandem axle tractors. A trailer of this length, which has its landing gear so located, will not nose over when being loaded.

It would be highly desirable if equipment suitable for use in bridge

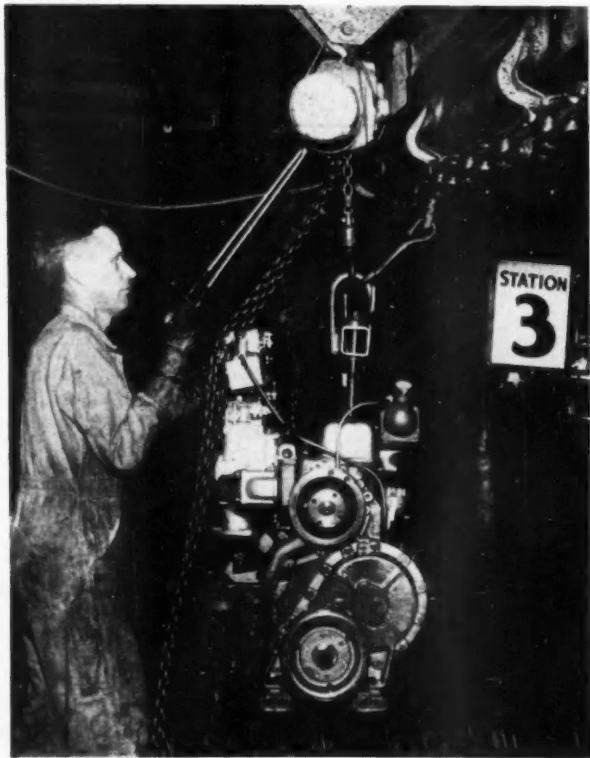
(Turn to page 87, please)

# Special Conveyor Setup at Reo Cuts Materials Handling Costs

By Joseph Geschelin

**S**INCE the inception of its postwar modernization program in 1946, Reo Motors, Inc., has been improving its materials handling facilities and now has some 10 miles of overhead and gravity roller conveyor systems.

*Engines are loaded or unloaded along the moving six-in. rail conveyor by means of an electric hoist mounted on an overhead crane.*



More recently Reo completed installation of what is believed to be one of the heaviest types of overhead conveyor systems in the industry—a heavy duty conveyor with six-in. rail—running some 2700 ft in length, with a load-carrying capacity of 4,500,000 lb in each eight-hour shift.

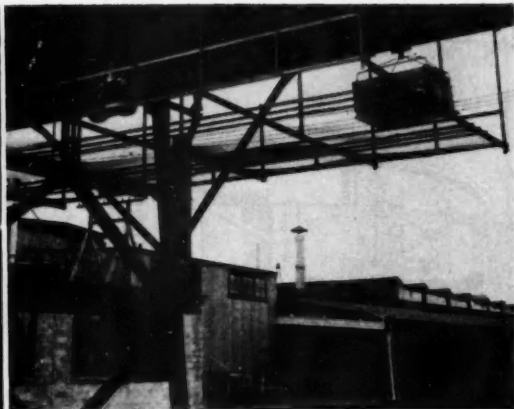
The conveyor carries 40 large slings, designed to accommodate standard skid boxes, the load per skid being up to 2500 lb. It also has hooks for attaching Reo engines in transit, each engine representing 1000 lb of weight. In addition, it carries a variety of wire baskets to handle the gamut of other parts used in engine assembly, truck chassis, and power lawn mower assembly.

Unique feature of this conveyor is that it travels continuously at the rate of 20 fpm, with all loading and unloading being done while the conveyor is in motion. As illustrated, industrial trucks are stationed at various key points and readily load a skid box onto the sling while both the truck and conveyor are moving. Unloading, too, is done with the load moving. Similarly, the engines are loaded and unloaded with the conveyor in motion. Such transfer is effected by the use of electric hoist cranes which enable the operator to attach the hoist hook to the engine and either mount it on the conveyor hook or remove from the conveyor, as the case may be, within the area swept by the crane.

This conveyor system solves an unusually difficult problem at Reo where the plant facilities consist of a large number of buildings situated on an



*View of portion of the four-in. conveyor system in the press shop. Here sheet metal parts are transported through the welding dept.*



*Between buildings, the six-in. rail conveyor lines thread their way across a wide railroad siding under cover as seen here.*

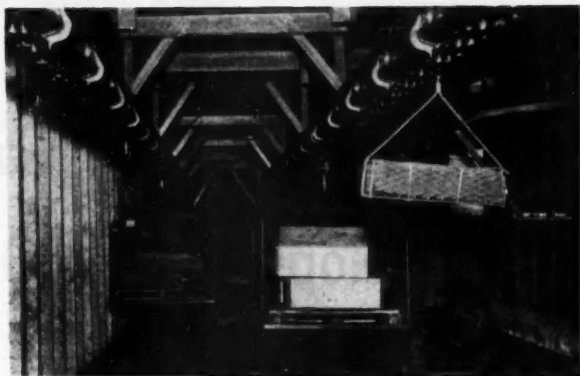
extensive land area. Previously it was necessary to transport the various parts and loads on industrial trucks from the engine and general manufacturing buildings across city streets and railroad tracks and sidings to the final assembly lines. Not only was this a costly and time-consuming operation but it also created a serious traffic problem in the plants, on the streets, and at railroad crossings.

With the introduction of the new conveyor systems considerable floor space has been freed for productive use, and a great deal of non-productive labor released for more useful work. Moreover, the conveyors have reduced sharply the number of industrial trucks required in service. These trucks now are employed at relatively fixed stations almost exclusively for loading and unloading operations at the conveyors, at freight and truck docks, and at the elevators. They are more gainfully employed without piling up mileage.

Another important item of cost saving is found in a major reduction of in-transit damage to sheet metal, engines, and other parts. All in all, it is estimated that the initial cost of the conveyor installation will be fully amortized in just one year of operation.

The six-in. conveyor system, which has two power drive units, travels through four floor levels, through subterranean passages to prevent wastage of floor space, and traverses five

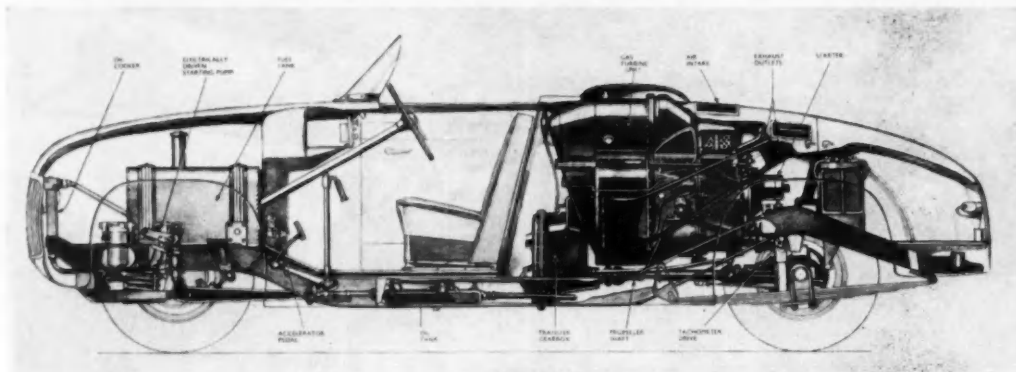
*(Turn to page 124, please)*



*At various points where the heavy duty conveyor system threads its way to productive departments, it follows a course through passages and covered areas without interfering with productive space.*

*Close-up along the new six-in rail heavy duty conveyor shows method of loading 2500-lb skid box onto slings on the moving conveyor. The fork truck moves with the conveyor during loading or unloading operations.*





This illustration shows location of units in the Rover turbine car. In general, arrangement of units and design of the body are almost the same as in the earlier Rover gas turbine car described and illustrated in *Automotive Industries* April 1, 1950. Illustration courtesy of The Autocar, London, England.

## British Rover Gas Turbine Develops Over 200 Horsepower

**S**HOWN here are cutaway views of the latest model of the British Rover turbine car and its engine. The car itself has a standard Rover chassis except for the special brakes and engine mountings. The body is essentially that of a Rover 75 with the top cut off. This is the car that attained a mean speed of 151.965 mph for the flying start kilometer during speed

tests on the Jabbeke Road in Belgium last June.

Output of the engine is over 200 hp, compressor speed at full horsepower is 40,000 rpm, and power turbine speed is 30,000 rpm.

Fuel pressure over most of the operating range is about 300 psi. Fuel feed is of the spill type, that is, there is a constant inlet fuel flow with the unused fuel

### Substantial Automobile Exports Foreseen for Australia

#### MELBOURNE, AUSTRALIA

**E**NTRY of the now well established Australian automobile manufacturing industry into the export field with popular and lower-priced models is discussed in a survey of the industry recently published by Australian Federal

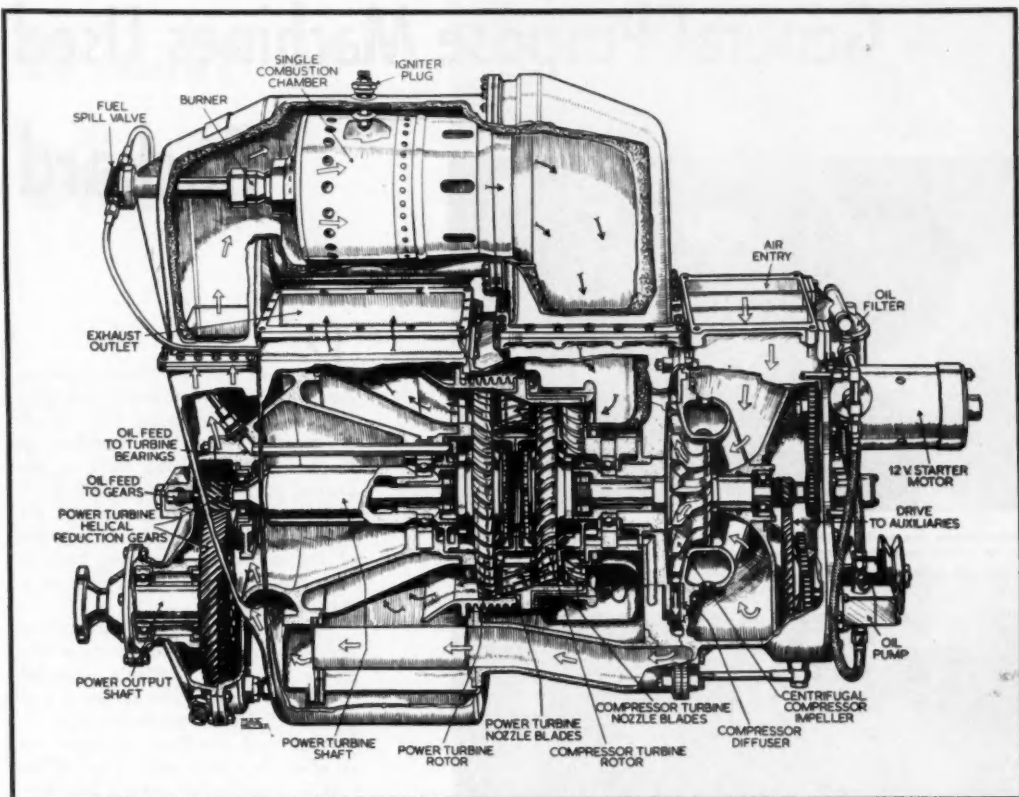
#### Ministry of National Development.

Findings made by the Ministry's Division of Industrial Development were based on a year's investigations. It sees the possibility of British and foreign-controlled automobile organizations now operating in Australia building up substantial export mar-

kets, but admits that due to export restrictions, the export market for Australian vehicles has not yet been tested.

As to domestic sales, a drop from recent demand levels of about 200,000 vehicles a year to an expected 160,000 this year will not seriously affect the local industry as a whole, according to the report. Reduced demand is considered likely to have little effect on Australian chassis and body production—85,000 bodies are made a year—and a relatively small





Cutaway view of the Rover T8 gas turbine. Outline arrows indicate circulation of air through the compressor to the combustion chamber; solid arrows show the flow of combustion gas through the compressor and power turbine to the exhaust. Auxiliaries at right are driven from the compressor turbine. Illustration courtesy of The Autocar, London, England.

being returned to the tank. Control is by a throttle in the return line which permits less fuel to pass as the accelerator pedal is depressed.

Starting is by means of a 12 volt motor which brings the turbine up to about 6000 rpm and is cut out at 10,000 rpm.

effect on the assembly of chassis and bodies from imported components and panels.

Apart from local production, the United Kingdom is the main supplier, and the Australian market as a whole is largely in the hands of large U. S. and United Kingdom manufacturers. Eight overseas companies operating plants in Australia hold about 90 per cent of the market.

Australia's dependence on the United Kingdom for most of its requirements ties future supply closely

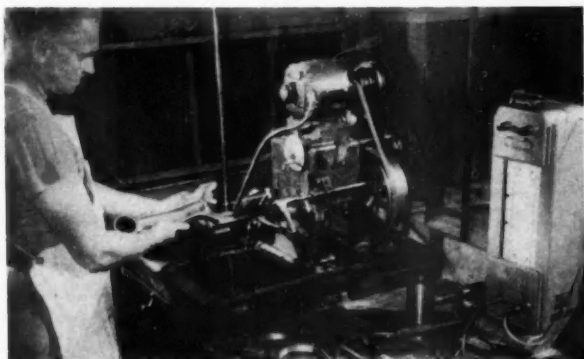
to English production, says the report. Present indications are that the current rate of supply to Australia could be maintained for the next 12 months. Beyond that the overseas supply position is uncertain. But the main factor influencing the level of supply will be Australia's import cuts. Stocks on hand and in process of assembly should meet the current demand.

Local production of vehicles is likely to be maintained at close to current levels and will be less affected by

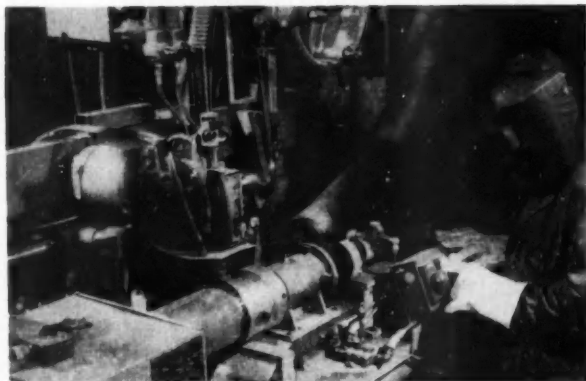
the import cuts. The industry has been having difficulty obtaining sufficient sheet steel from traditional sources, and it is expected that supplies will be obtained from alternative sources, but with difficulty and at higher prices. Sheet steel supplies should be more satisfactory in 1953. It is of interest that the Australian sheet steel industry is at present supplying about half the requirements of the automobile industry for body production.

(Turn to page 126, please)

# General Purpose Machines Used Packard



Above—Some impression of the quality control program on the Packard engine may be gained from this detail operation. Connecting rod bolt holes, previously finished, are given a hand-honing operation in the Sunnen hone, then checked for size with the Sheffield Precisionaire gage.



Left—Welding of the cylinder head and liner into a single element is done in this special welding machine built by Expert. Heart of the unit is the Linde automatic submerged arc-welding head which may be seen in the center directly over the work.



Left—Here is the setup in a Lucas horizontal boring mill for gallery drilling of through-bolt holes in the lower section of the block. These holes go entirely through the sides of the block as well as through the main bearing caps. The operation is performed in three stages in the same setting:  $\frac{1}{16}$ -in. drill from each side, in two operations; drill 0.4375 in. from each side, in two operations; ream through.

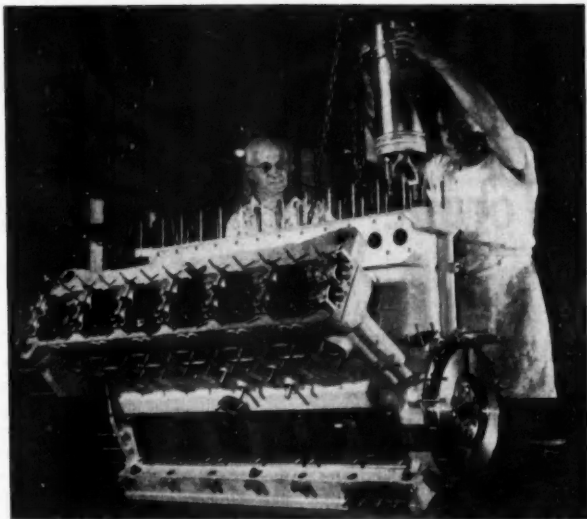
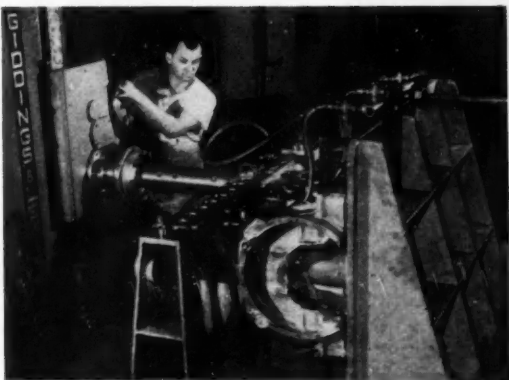
Right—This Giddings & Lewis horizontal boring machine is seen boring cylinder barrel bores for receiving removable wet sleeves. The block is held horizontally in the fixture and is first rough-bored. While still held in the massive fixture, the boring bar is removed and the cylinder head surface is given a finish-mill cut to assure proper axial alignment of the bores. Following this the bores are finish-bored and recessed, using a special Davis boring bar.

# to Make Diesels

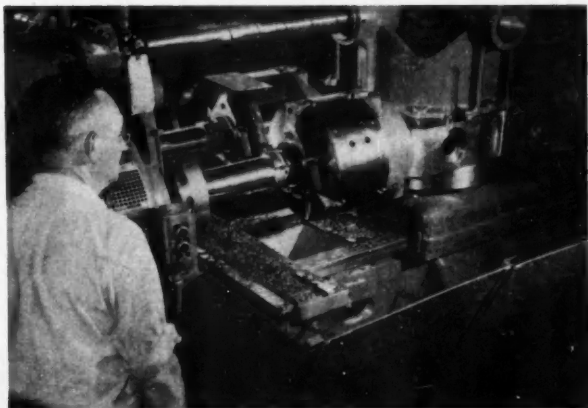
eral well-known makes of horizontal boring machines, including Lucas and Giddings & Lewis, usually associated with tool room and die shop operations, are employed for a variety of production operations. A number of Cincinnati Hydro-Tels have been adapted to some of the heavy milling operations. The Hydro-Tel shown here is used for straightforward milling of cylinder head bank surfaces without employing the tracer attachment. In this case, the Hydro-Tel was adopted primarily because it so capably handles heavy milling.

Among the items of heavy duty machinery recently installed on this line is the big Potter & Johnston turret lathe, illustrated here.

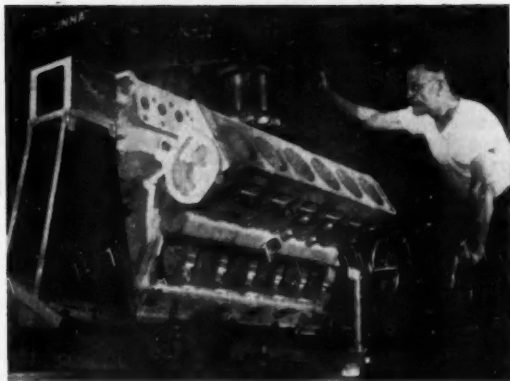
*Right—One of the latest items of equipment is the heavy duty Potter & Johnston turret lathe for boring cylinder liners. As shown, this is a two-spindle machine with four stations on the turret. Two stations on one side are for roughing; two stations on opposite side, for finish-boring.*



*Above—Engine final assembly, showing installation of the complete cylinder sub-assembly. This consists of the integral head and liner together with the valve mechanism overhead, as well as the piston and rod assembly.*



*Below—A big Cincinnati Hydro-Tel machine is used for milling cylinder head banks on both six- and 12-cylinder Packard Diesel engines, the 12-cylinder V-type block being shown here. For this operation the Hydro-Tel is used without tracer attachment.*



# Fuller Announces New Torque Converter

**A** NEW torque converter coupling drive designed for use in tow trucks, front end loaders, route delivery trucks, hoists, logging yarders, and similar equipment has been announced by the Fuller Manufacturing Co. of Kalamazoo, Mich. The new drive offers the advantage of an automatic change from 2 to 1 torque multiplication to 1 to 1 coupling operation as torque requirement dictates.

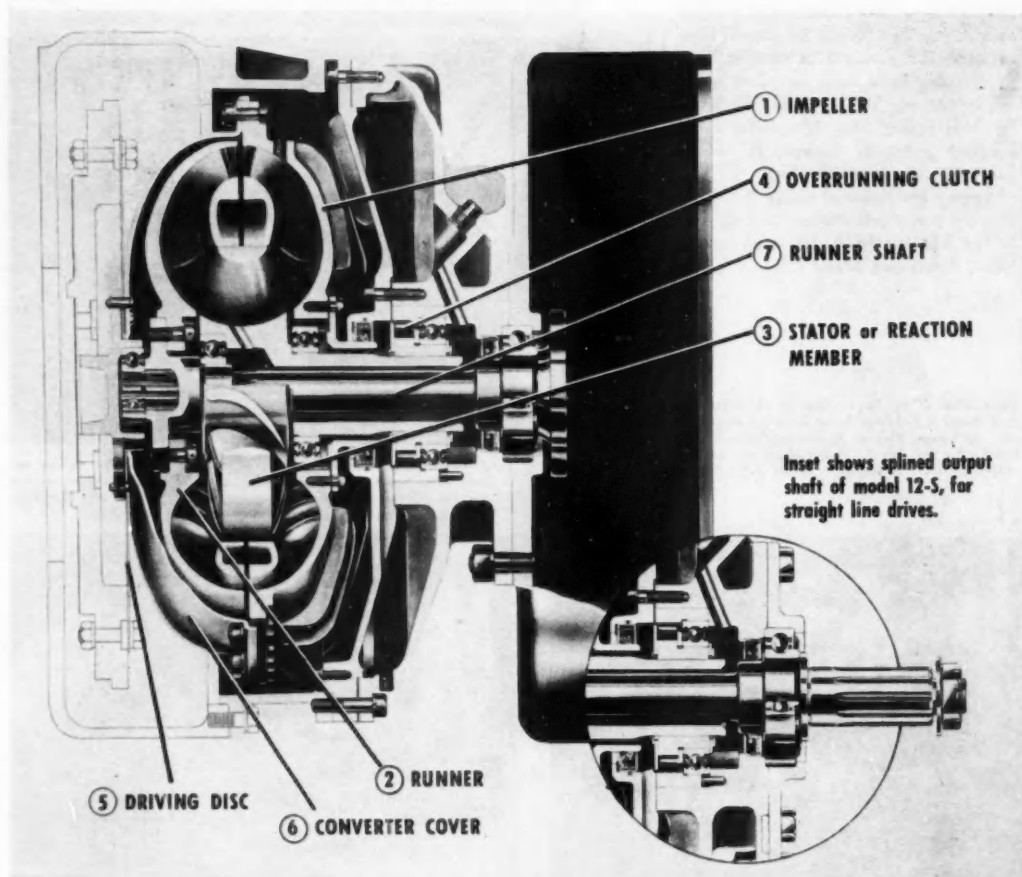
The Fuller industrial torque converter is a single

stage design with three simple elements consisting of impeller or pump, runner, and reaction member or stator. The reaction member is mounted on an overrunning clutch which permits rotation with the runner while in coupling range—thus the unit is a two phase design. The change from converter operation to straight hydraulic coupling operation and back is automatic, depending only upon the amount of torque required in the drive line.

Power is delivered from the engine flywheel through a thin, flexible driving disk and converter cover to the impeller. Rotation of the impeller throws oil into the vanes in the runner which is splined to the output or runner shaft.

The oil in the converter, operating in a closed circuit, leaves the runner at the inner edges of the vanes and enters the reaction member. The vanes in the reaction member are curved so as to turn the oil back

(Turn to page 98, please)



Cutaway view of the Model 12-A Fuller industrial torque converter. Inset at lower right shows output shaft of the Model 12-S converter.

# News of the MACHINERY INDUSTRIES

By Thomas Mac New

Research Facilities of  
Leading Press Makers  
Working on Cold Extrusion Techniques.

## Cold Extrusion

Despite the paucity of specific information on new developments in the art of cold extrusion, data gathered from various sources indicate that great progress is being made and that some of the leading manufacturers of press equipment are participating in this program. In this connection, Clearing Machine Corp. reports extensive work done on its press equipment for Government projects; and has on order a 1500-ton press designed specifically for experimental work on cold extrusion.

In its current activity Clearing has had excellent results with mechanical presses designed specifically to exert pressure high up on the stroke.

The field of cold extrusion is so extensive as to attract the talents of the leading press producers, some of whom have been mentioned in news comment in *AUTOMOTIVE INDUSTRIES* during the past year. To this list may be added, Clearing, Danly, Verson, and Bliss among others.

## Ductile Iron

We have noted several instances recently where ductile iron has been coming into more prominent usage for various machine parts where ordinary cast iron members have failed. This spheroidal graphite type of iron is now being used very satisfactorily for chain brackets on automatic plating machines manufactured by Frederick B. Stevens, Inc. of Detroit. The maker had considerable difficulty with cast iron brackets since there was frequent breakage during the plating cycle. After some research by Stevens engineers, it was decided to use the tougher and higher strength ductile iron.

## Machine Tool Builders Hit Government Policy

At a recent NPA committee meeting of machine tool producers, the tool builders rapped the Government for its on-again, off-again defense production policy. This isn't the first time that the builders have asked for

a well defined defense policy where they will know what is to be expected of them in respect to the production capacity to be maintained and for what length of time. If the Government does not see fit to clarify the issues and maintain a substantial defense production level, industry sources state that they may well be once again caught in the middle from a defense standpoint. One major question the Government has failed to answer is, "How can a machinery manufacturer economically expand production capacity to meet defense emergency needs when orders are being cancelled?" Some builders have reported that they are living solely off of their backlog.

## Around the Industry

Rotor Tool Co. has recently opened its new \$1 million air-conditioned plant in Euclid, Ohio. The company is celebrating its 25th anniversary this year.

Some of the largest machines for the forming of steel boiler drums, seamless steel tubes and hollow vessels have been designed, built and installed by Hydropress, Inc., New York, N. Y., in the Barberton, Ohio, plant of Babcock & Wilcox. The installation consists of a vertical 6500-ton hydraulic piercing and bending

press and a 1200 ton horizontal hydraulic pushbench. On the piercing and bending press, steel boiler drum sections up to 42 ft. in length are formed. The press serves also for piercing preheated alloy and carbon ingots, of varying cross sections for subsequent drawing on the hydraulic pushbench. After piercing, the pushbench, which has a 30 ft. stroke, draws the ingots into seamless tubes and hollow pressure vessels up to a maximum 26 in. ID, 4½ in. wall thickness, and 22 ft. in length.

A nine-day machine tool familiarization training course was given at Rochester Institute of Technology, Rochester, N. Y., recently. This course consisting of lectures and machine tool demonstrations was intended to acquaint sales engineers and technicians with the machine tools and related equipment used by a manufacturer buying their product.

Recognizing the increasing importance of and specialization in application of electrically-and-manually-operated hand lift trucks, the Yale & Towne Manufacturing Co., has established separate sales departments for its Work saver and hand lift truck product lines. James H. W. Conklin, general sales manager, has announced the promotion of John I. Somers as sales manager for Work

(Turn to page 94, please)

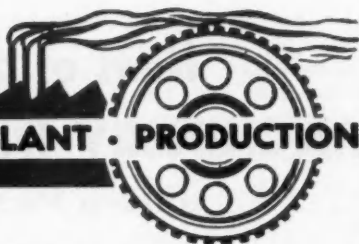
## MACHINE TOOL INDICES

(1945-46-47 = 100)

	New Orders						Production Rate		Ratio of Unfilled Orders to Production Rate	
	Total		Foreign		Shipments					
	1952	1951	1952	1951	1952	1951	1952	1951	1952	1951
January	347.8	475.4	33.6	61.3	266.6	114.3	259.0	129.6	18.1	15.2
February	318.6	615.3	14.4	78.2	279.6	123.8	277.1	135.0	17.1	18.0
March	324.3	590.3	23.3	102.1	299.5	158.9	292.3	142.8	15.7	19.9
April	293.5	516.1	15.6	66.1	307.9	157.7	304.4	157.7	14.8	20.4
May	284.6	483.0	31.4	35.7	323.0	175.1	321.6	169.5	13.6	20.1
June	342.9	558.6	20.3	56.4	330.8	182.8	342.6	176.8	12.6	20.9
July	376.4	490.6	15.0	54.9	254.6	144.7	338.4	183.2	12.0	22.0

Source: National Machine Tool Builders Assn.





FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

### Combination Mechanical-Magnetic Separator

Model MMG 34-12, a combination mechanical-magnetic separator, is especially designed to separate parts from Roto-Finish abrasive chips where both ferrous and non-ferrous

parts are processed using Roto-Finish methods. Unique feature of the MMG 34-12 is that the magnetic and mechanical separating mechanisms are interchangeable on the portable frame.

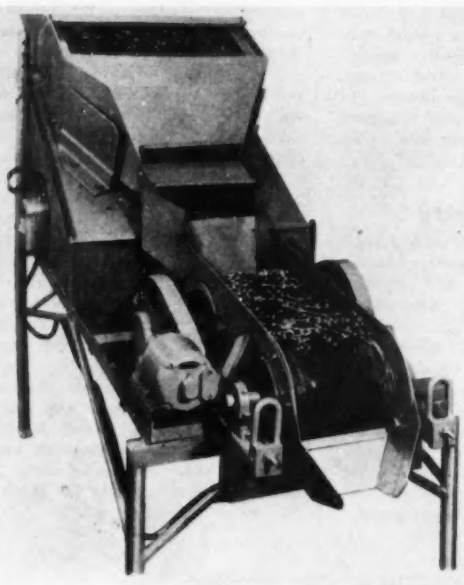
As a result, the unit can be used either as a mechanical or magnetic separator.

In operation, a hoist pan containing the mixed parts and processing media is placed on the incline loading support of the separator. When used for mechanical separations the mixed mass passes over a motor driven, agitated separator screen. Separation is made as the oversize parts are discharged from the top of the screen, while processing chips go through the screen and discharge into a hoist pan below.

Amount of agitation is controlled by a variable stroke adjustment. Screens are available in mesh sizes of 1/16 in. to 1 1/2 in. and correspond to Roto-Finish chip sizes. Screen size is 34 in. by 27 in.

For magnetic separations the magnetic separating unit replaces the agitated screen unit. Parts and Roto-Finish chips pass over a magnetic pulley. Parts are separated magnetically and then conveyed to a container, while the chips fall into a hoist pan below. The Model MMG 34-12 mechanical-magnetic separator is driven by a 1/3 hp, 220/440, three-phase motor. *Roto-Finish Co.*

Circle E-1 on page 65 for more data



*Roto-Finish mechanical - magnetic separator, Model MMG 34-12.*

### Special Grinding Attachment for Chasers

The No. 20 chased grinding fixture, now available, is said to provide an inexpensive and satisfactory method of grinding Landis Tangential Chasers. This fixture is used to grind the compound rake and lead angles.

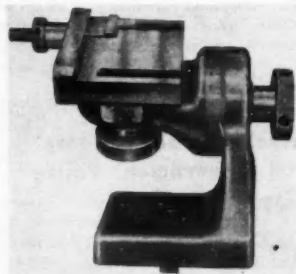
Supported by the base casting is a crossarm, which is arranged so that the chaser platen can be adjusted vertically. The platen can be rotated throughout a 360 deg circle horizontally thus providing an accurate means of producing the desired lead angle. Knurled knobs, which have pin holes for added leverage, securely hold

the fixture in the position in which it is set.

It can be adapted for use on any grinding machine which has a traversing table regardless of the type grinding wheel it uses. The base of the fixture is made so that it can be clamped to a T-slotted table or on a magnetic chuck.

The No. 20 fixture covers chaser widths from 1 1/4 in. to 4 1/2 in. This fixture can also be used for Chaser widths from 1/2 in. to 1 1/4 in. *Landis Machine Co.*

Circle E-2 on page 65 for more data

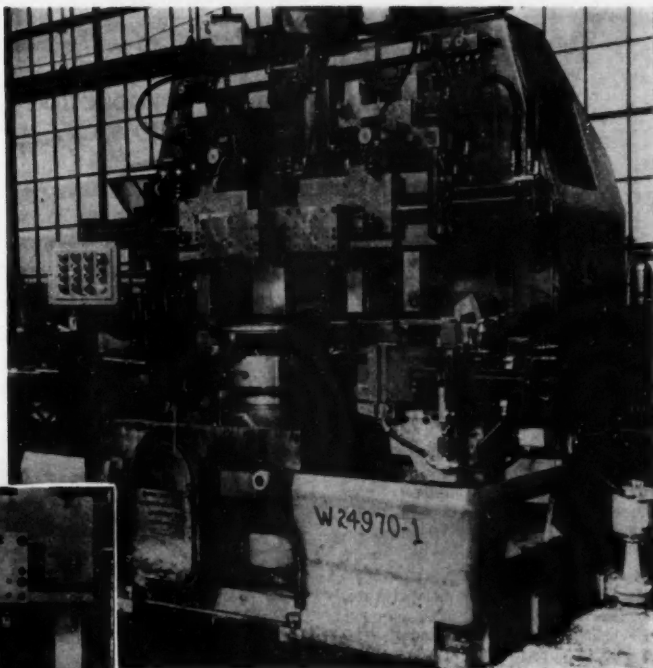


*Landis grinding attachment for chasers*

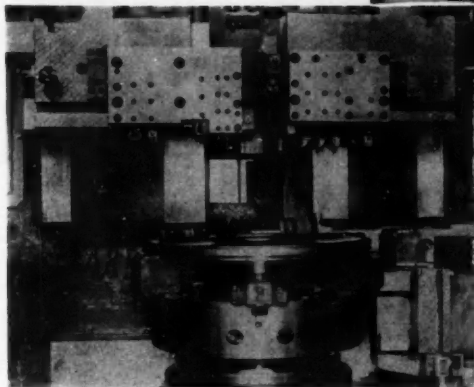
## Vertical Turning and Boring Machine for Jet Engines

Special vertical turning and boring machines have recently been engineered and produced for the jet engine program. These model VTMS-30 machine tools are utilized for the roughing, semi-finishing and finishing of jet engine disks.

For this high production application, the machine has a vertical type



Match & Merryweather vertical turning and boring machine, with the side removed, shows the tooling utilized.



This close-up of the Match & Merryweather VTMS-30 type machine illustrates the tool slides in the up position.

spindle, automatic cycling, extreme rigidity and high horsepower. In one operation, the unit is running at approximately 225 sfpm and has seven tools engaged in the work at one time. It takes about  $\frac{1}{2}$  in. depth of cut over the complete face of a 24 in. diam stainless steel disk in 22 min.

The machine has a constant speed drive and features a wide speed range through pickoff gearing. Tool slides cycle automatically between hardened adjustable stops with micrometer adjustment.

Tools are set in blocks and these blocks can be interchanged on any of the VTMS-30 units. A wide feed range is available to each tool slide through independent hydraulic control. Drawbar type chucking is utilized. Match & Merryweather Machinery Co.

Circle E-3 on page 65 for more data  
(Turn to page 58, please)

### VTMS-30-R SPECIFICATIONS

Chuck diameter	21 in. diam.—semi-finish
Spindle nose	24 in. diam.—roughing
Chuck swing, max.	A-15 American Std.
Max. work height from spindle nose	34 in.
Max. tool slide travel, cross rail heads:	13 in.
Left-hand slide, vert.	11 in.
Left-hand slide, horiz.	8 $\frac{1}{2}$ in.
Center slide, vert.	11 in.
Center slide, horiz.	1 $\frac{1}{2}$ in.
Right hand slide, vert.	11 in.
Right hand slide, horiz.	8 $\frac{1}{2}$ in.
Angular adjustment—5 deg	
Max. tool slide travel, side rail heads:	
Right hand side, vert.	4 $\frac{1}{2}$ in.
Right hand side, horiz.	8 in.
Angular adjustment—10 deg.	
Spindle speed ranges	12.5 to 92 rpm
Tool slide feed rates	38 to 275 rpm
Spindle diameter at top bearings	11 in.
Double tapered roller bearing spindle mounting:	
Radial load at 500 rpm	28,070 lb
Thrust load at 500 rpm	21,285 lb
Cylindrical roller bearing rear mounting: Radial	
load at 500 rpm	8,600 lb
Hydraulic drive motor	7 $\frac{1}{2}$ -10 hp, 1,200 rpm
Main drive motor	60 hp, 1,200 rpm
Floor space	85 in. by 99 in.
Net weight, approximate	45,000 lb

# NEW EQUIPMENT

PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

(Continued from page 57)

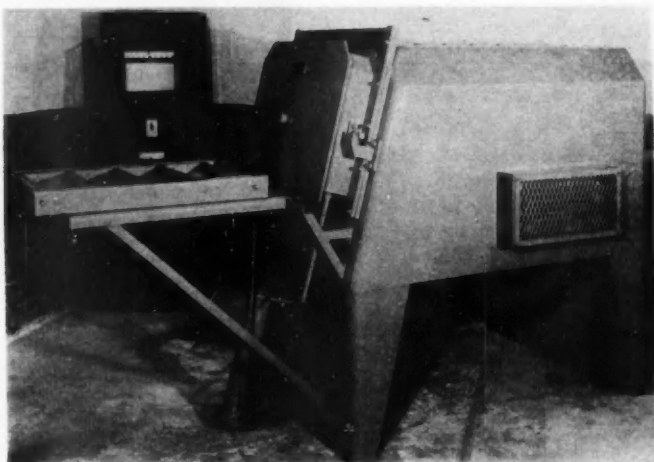
## Unit for Bright Tempering and Controlled Oxidation

A unit that is said to make possible both bright, scale-free tempering, and controlled oxidation tempering from 400 F to 1400 F has been announced. Known as the D-300 tempering unit, the sealed, controlled atmosphere furnace utilizes a completely new process of controlled oxidation.

For bright tempering, the tempering unit is supplied during the entire cycle with a protective atmosphere. After sufficient time at temperature, the load is cooled in the furnace until it reaches approximately 400 F. The bright scale-free work is then cool enough to be removed from the furnace without danger of oxidation. The finish is claimed to remain clean, bright, and scale-free.

The D-300 also produces a controlled oxide coating, which is often desired to reduce corrosion or wear, and to produce an attractive blue-gray or blue-black appearance. This is accomplished either in a separate operation or concurrently with a tempering or annealing operation.

Protective atmosphere is used to maintain a bright surface during any

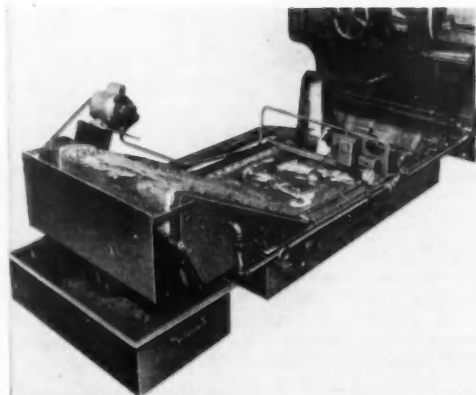


Ipsen tempering unit, D-300.

## Industrial Endless Belt Coolant Filter

Through the use of an endless belt a Delpark industrial endless belt filter

is said to permit the utilization of the same filtering media over and over.



Delpark industrial endless belt filter.

necessary tempering or annealing operations prior to the controlled oxidation cycle.

After the load heats or cools to the oxidation temperature the flow of protective gas is discontinued and a predetermined quantity of water is introduced into the unit for a specified period. The work is then removed from the furnace and air-cooled or liquid quenched.

The D-300 is an automatic, sealed unit designed for use with a controlled atmosphere, although it can also be used as a conventional tempering unit. It has a welded gas-tight frame, and a flat, ground door frame and door plate. Ipsen Industries, Inc.

Circle E-4 on page 65 for more data

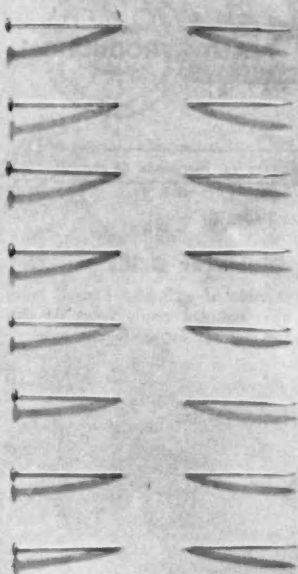
This filter, designed to serve individual machine tools or larger central coolant systems, can also be applied to numerous other industrial applications. It is a continuous, self cleaning gravity filter. It filters solids from liquids that will flow by gravity through filter material and discharges the solids, in a relatively dry state, into an outside container.

The filter material in the form of endless belting, rests on, and conforms to, a flat endless conveyor of open construction. Sloping sides form a shallow pool of the conveyor and an inclined discharge ramp provides for the removal of filtered solids.

Filtered solids are discharged from the endless belt at the end of the ramp into the disposal container. Industrial Filtration Co.

(Turn to page 60, please)

Circle E-5 on page 65 for more data



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**NEW****EQUIPMENT****PLANT • PRODUCTION**

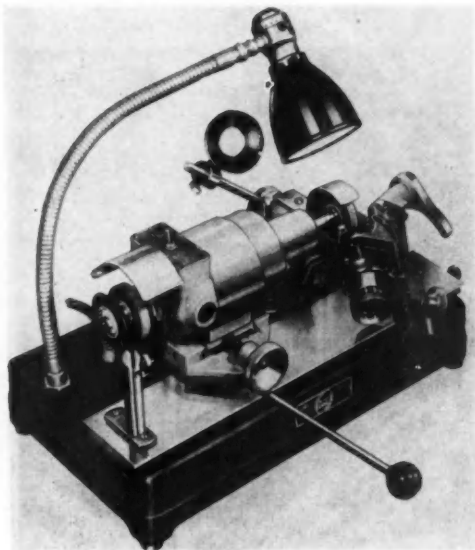
For additional information, please use postage-free reply card on page 65

(Continued from page 58)

### Grinder for Small Diameter Drills

Now available to the trade is a small diameter drill grinder for drills from No. 70 to 1/4 in. It is said to be

capable of grinding a drill point to any included angle from 90 deg to 150 deg and any clearance angle from



Dumore small-diameter drill grinder

five deg to 15 deg. Broken drills can be quickly reclaimed and sharpened.

For clearance angle selection, a numbered dial is utilized. A thumb screw is used to obtain the proper point angle. There are 171 collets available for the drill grinder. *Dumore Co.*

Circle E-6 on page 65 for more data

### Heavy-Duty Holders and Electrodes

Heavy duty Nu-Twist holders and electrodes for spot welding forces over 6000 lb are on the market. They are designed with flat mating surfaces between holder and electrode. Double grooved construction in bore of locking nut is said to positively align electrode centrally in the holder and lock electrode in position.

Flat mating surfaces between electrode and holder withstand highest pressures and are silver plated for lowest contact resistance.

An O ring seal provides water tight connections. Coolant hole and wall thickness of the electrodes are properly proportioned for cooling with adequate metal section to carry the higher welding currents without overheating.

Retractable coolant head permits retracting adjustable coolant tube when removing or installing electrodes. Coolant tube automatically locks into normal position when coolant head is pushed back into the operating position.

Nu-Twist holders are available from stock in eight in. and 12 in. lengths and in 1 1/2 in., 1 3/4 in., two in. and 2 1/2 in. barrel diameters. *P. R. Malory & Co., Inc.*

Circle E-7 on page 65 for more data

### Adjustable Coil Grab for Use with Cranes

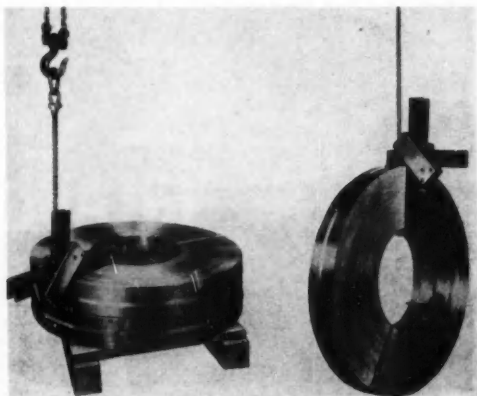
Now available to the trade is the Dixon coil grab. A prong tapered to fit between the coils, in the space made by the coil bands, is positioned while the opposite jaw is placed in the center of the coil. As the crane lifts, the grab automatically adjusts to the coil size and the tapered prong slides between the coils. As the coil lifts, the Dixon grab turns to allow the coil to move to a vertical position, locked by its own weight. The coil grab handles coils up to 5000 lb.

Larger sizes for individual applications are available on special order from the manufacturer. *Materials Handling Div., Dixon Research, Inc.*

Circle E-8 on page 65 for more data

(Turn to page 62, please)

Dixon coil grab.







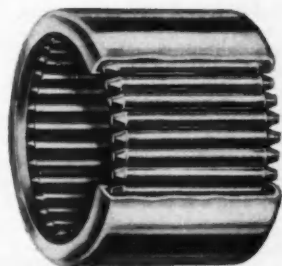
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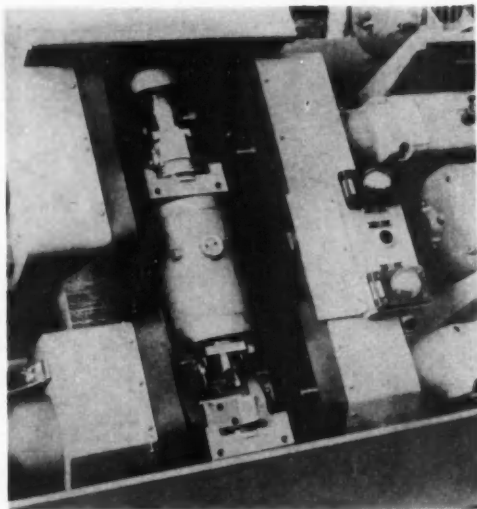
AUTOMOTIVE INDUSTRIES, September 15, 1952

**NEW****EQUIPMENT****PLANT • PRODUCTION**

For additional information, please use postage-free reply card on page 65

(Continued from page 60)

### Boring Machine for Piston Pin Holes



Heald boring machine,  
Model 355 Bore-Matic.

Model 355 Bore-Matic semi-finishes bores, finishes, grooves and chamfers piston pin holes in pistons at the rate of 700 parts per hour.

Basically, the machine consists of four special hydraulic cross slides mounted on a fabricated base with a two-station hydraulically operated fixture positioned between the slides. A boring head and related drive equipment is mounted on each slide.

While the rear opposing slides are operating on one piston, the front slides are at rest for unloading and loading. After piston is positioned in

front station, a button is operated which, following completion of the operation on rear station, automatically clamps part and starts second half of cycle.

Boring heads run continuously and the coolant for each station, which is piped through the clamping ram into the piston, shuts off automatically as the cross slides for each station reach the rest position.

Part is hydraulically clamped using the OD, dome end, and the OD of rough piston pin bosses on the inside of the piston. *Heald Machine Co.*

Circle E-9 on page 65 for more data

### Electrical Comparator Gages

Now in production is a line of electrical comparator gages. Each of the models provides four gaging ranges.

One comparator model, No. 10, for example, affords full scale ranges of plus-or-minus 0.000020 in., 0.000040 in., 0.000200 in. and 0.000400 in. In the 0.000020 in. range each meter division has a value of 0.000001 in. and

parts can be checked to a millionth.

The comparators utilize the electromagnetic principle of magnifying the movement of the spindle tip. Spindle pressure in the models is adjustable from four to forty oz. The desired spindle pressure is set by means of a knob and associated calibrated dial. A spindle lifter is supplied to facili-



DoALL electric comparator gage.

tate checking of very small or delicate parts. Spindle tips are of boron carbide. The gaging head swivels 360 deg in both horizontal and vertical planes and can be removed for use in special gaging setups or in remote indication setups. *DoALL Co.*

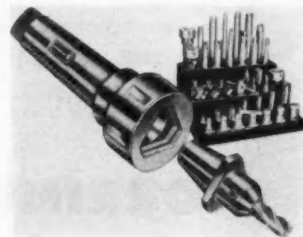
Circle E-10 on page 65 for more data

### Quick Change Tool Holder

A triple lock, Portage Double Quick, tool holder with a locking feature that is said to permit faster tool changes and assure constant repositioning has been announced. The 57-piece tool set includes holders for boring, milling, and lathe applications.

Boring mill holders are No. 4, 5, and 6 morse taper and No. 40 and 50 taper for milling machines. Turret lathe adaptors are designed to fit any turret lathe. End mill adaptors range in size from  $\frac{3}{8}$  in. up to  $1\frac{1}{4}$  in. Also included in the set are adaptors for shell mills, end mills, drill chucks, and boring heads. *Portage "Double Quick" Tool Co.*

Circle E-11 on page 65 for more data



Portage quick change tool holder and adaptor set.

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**Failure rate on machine tool motors  
cut from 1 a month to 0 in 2 years!**

In a line of 20 turret lathes, piece-work operators at Mueller, Ltd., Sarnia, Ontario, were burning-up drive motors at an average rate of one a month. These lathes were driven by Class B motors, rated at 5 hp at 650 rpm and subjected to 1200 full reversals an hour. Under such operating conditions, 18 replacement motors had to be carried in stock; occasionally all 18 of the spares were called upon to maintain production.

Two years ago, 25 of these motors were rewound with Silicone (Class H) insulation by Canadian Westinghouse Company. Twenty of them have been in service ever since. The 5 replacement motors are still standing by, in spite of the fact that some of the more ambitious operators took the overload capacity of these Class H motors as a personal challenge.

That kind of life and overload capacity, demonstrated in thousands of applications, proves the economy of Class H insulation made with Dow Corning silicones. Capable of putting out 50% more power than their name-plate rating, Class H insulated motors have 10 to 100 times the life expectancy of the next best class of motors under comparable service conditions.

Ask your motor supplier or rewind shop about Silicone (Class H) insulation or write direct to Dow Corning Corporation, Midland, Mich.

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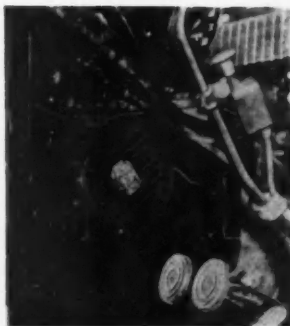
Michigan

Atlanta • Chicago • Cleveland • Dallas • New York • Los Angeles • Washington, D.C.  
In Canada: Fiberglas Canada Ltd., Toronto • In England: Midland Silicones Ltd., London

# NEW

# PRODUCTS.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65



## Truck Cab Foot Cooler

Recently introduced is a power-driven foot cooler for truck cabs that consists of a louvred plate, fan and motor housing, and adjustable louvred interior grille. The unit has an outside diameter of nine in., is six in. long, and weighs only seven lb.

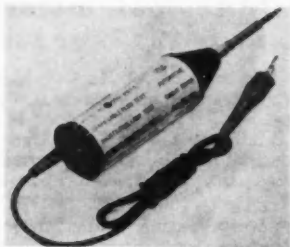
Specifically designed for cab-over-engine truck cabs, it is claimed that cooler can be adapted to almost any type of cab. Its 75 cfm capacity is said to assure positive cooling and increased driver comfort and dispel extreme engine heat often encountered

in heavy summer driving conditions, in congested traffic, and up long grades in low gear.

Rotating inner grille can be directed toward any part of the cab floor. Propeller-type fan draws cool, fresh air from outside the cab. An air shutoff provides air-tight seal to prevent cab heat loss during winter operation.

Dash panel switch controls blower of the cooler. Entire unit may be quickly detached by removing only four screws. *Evans Products Co.*

Circle P-4 on page 65 for more data

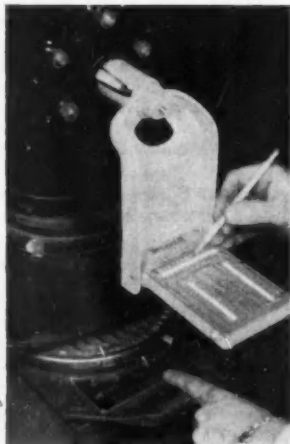


## Portable Automobile Circuit Tester

Light and portable, an automobile circuit tester now available is said to be capable of testing complete automobile electrical systems and will adjust voltage and current regulators. It provides a continuity test that may be safely used to check all accessories, such as lights and horns, without disconnecting them from the circuit. The

unit is reported ideal for tracing shorts and will not become damaged in the event of accidental contact with hot battery leads or other live wires. Built of high-impact materials, it is permanently engraved for easy reading, and has a convenient built-in spotlight. *Leo Electronic Labs., Inc.*

Circle P-5 on page 65 for more data



## Three-Way Alignment Gage

Fast, accurate readings of cambering pin inclination-caster and turning radius are claimed for three-way alignment gages used in combination with any good turning radius gages. The operator is able to watch the simultaneous change of caster and camber angles as adjustment or other type correction is accomplished.

Gages are said to be quickly and securely held in place by a spindle nut clamp. The adapter clamp is attached by locating its points in cotter key slots in the spindle nut. A special ground washer is furnished to slip over spindle nut for use on those vehicles where the bearing thrust

washer is too small to fit the adapter sleeve properly.

Three easy-to-read spirit levels along with accurately calibrated scales are said to give quick direct readings, which are taken from the wheel bearing face.

When not in use, gages are held in a closed position by a spring catch. The units may be used in conjunction with a new wheel alignment specification chart available from the manufacturer. This gives specifications on all current U. S. car models and those from 1940 on. *Weaver Manufacturing Co.*

Circle P-6 on page 65 for more data

(Turn to page 102, please)

# Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain **FREE LITERATURE** and Additional Information on **NEW PRODUCTION AND PLANT EQUIPMENT**, AND **NEW PRODUCTS** Described in This Issue of **AUTOMOTIVE INDUSTRIES**. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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## FREE LITERATURE

### Shielded Enclosures

Bulletin No. 3 describes a line of cell-type shielded enclosures (screen rooms) providing the high attenuation required for testing and evaluating sensitive electrical and electronic equipment without background radio interference. They are designed to meet JAN-I-225 16E4 (Ships) and MIL-I-6181 specifications for radio interference suppression. *Ace Engineering & Machine Co.*

Circle L-1 on postcard for free copy.

### Hydraulic Couplings

Described in Bulletin 500 is a disconnecting hydraulic coupling that is said to combine the shock-absorbing advantages of a fluid drive with the disconnecting features of a master clutch.

Diagrams of Model HUD, explaining the fluid dumping feature which disconnects the output shaft from the source of power, are presented, and circuits are illustrated. A horsepower range chart is also included. *Twin Disc Clutch Co., Hydraulic Div.*

Circle L-2 on postcard for free copy.

### Control Valve Design

Featured in a 16-page bulletin are a complete review of the development of modern control valves and a survey of future designs. *Cenflow Corp.*

Circle L-3 on postcard for free copy.

### Mechanical Remote Controls

One typical sample of a line of remote controls which operate in three directions is described in Catalog 300-A. Unlimited travel and rotary movement are special features of the push-pull unit. General descriptive material and applications are included in the brochure. *Teleflex.*

Circle L-4 on postcard for free copy.

### Material Handling

Vol. 11, No. 1 of the "Material Handling News" relates the story of engineering, production, technical counsel to customers and prospects, and world-wide service setup of an equipment manufacturer. *Industrial Truck Div., Clark Equipment Co.*

Circle L-5 on postcard for free copy.

### Silastic R Tape

This tape is described in a data sheet (G-25) as being improved and modified for electrical insulation. *Dow Corning Corp.*

Circle L-6 on postcard for free copy.

### Dual-Fuel Carburetion

A limited number of copies of an article entitled "Test Results With Dual-Fuel Carburetion at High Compression" are now being offered. *Automotive Industries.*

Circle L-7 on postcard for free copy.

(Please turn page)

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#### NEW PRODUCTS

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# Surface Hardening Process

Vol. 8, No. 3 of "Heat Treating Hints" contains a short article on "Malcomizing," a process which is said to produce an intense superhard surface by the action of nitrogen with steel. A 24-page bulletin on the process is offered. *Lindberg Engineering Co.*

Circle L-6 on postcard for free copy.

# Aluminum Bus Bars

Bulletin B-750 on BUStribution DUCT with aluminum bus bars enumerates the features of aluminum as an electrical conductor. A chart comparing the relative size, weight, and performance of aluminum and copper in LO-X and Plug-In BUStribution DUCT also is featured. *Bulldog Electric Products Co.*

Circle L-9 on postcard for free copy.

# Motor Drives

Described in a 16-page booklet now available are motor drives of from 1/4 to 7 1/2 hp. Upright and horizontal drives of either closed or skeleton types are included. *Worthington Corp.*

Circle L-10 on postcard for free copy.

# Anti-Friction Bearing Heat

Vol. 12, No. 4 of "The Bearing Engineer" contains an interesting article on the causes of excessive anti-friction bearing heat. Suggestions for avoiding and correcting such difficulties are given. *The Torrington Co.*

Circle L-11 on postcard for free copy.

as die and mold finishing, die and mold maintenance, tool finishing and deburring, heat treat scale removal, and surface preparation for plating in all applications where close tolerances on work must be maintained. *American Wheelabrator & Equipment Corp.*

Circle L-13 on postcard for free copy.

# Milling Machine Setups

"Cutting Gear Teeth on a Milling Machine" is the title of a 60-page booklet that contains complete instructions on setting up milling machines for specific problems. Valuable mathematical and tabular data are included. *Cincinnati Milling Machine Co.*

Circle L-14 on postcard for free copy.

# Surface Active Agents

An eight-page bulletin lists metal-working applications where efficiency can be improved and time and costs cut by the addition of a surface active agent. Benefits gained in actual production and suggestions for other applications are included. *E. F. Houghton & Co.*

Circle L-15 on postcard for free copy.

# Tool and Die Steel

A bulletin recently released on Ry-Die, a five per cent chromium-type, general-purpose air hardening tool and die steel, gives chemical analysis, hardening characteristics, wear resisting properties, instructions for heat treatment, and lists typical applications. *Joseph T. Ryerson & Son.*

Circle L-16 on postcard for free copy.

# Abrasive Discs

Helpful information for users of abrasive discs on surface grinding operations is contained in a 60-page booklet. Contents include abrasive fundamentals, selection data, types available, standard markings, spindle speeds, coolant selection, dressing, safety, grinding various materials, and care of discs. *Gardner Machine Co.*

Circle L-17 on postcard for free copy.

# Russian Industry

There is available a limited supply of reprints of an article entitled "What is Russia's Industrial Strength?" Facts and figures on the Soviet economy are presented and analyzed. *Automotive Industries.*

Circle L-18 on postcard for free copy.  
(See preceding page)

# Flexible Metal Hose

Bulletin CMH-115R on RT-6 and RT-8 flexible metal hose gives full specification data on these types of Rex-Tube, used in such applications as ventilating ducting, refrigeration tubing, and automotive exhaust. *Flexonics Corp.*

Circle L-19 on postcard for free copy.

# Wet Blasting

Recently released is a six-page brochure (No. 43) showing the application of wet blasting to such work

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L-3	L-9	L-15	L-21	P-3	P-9
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L-5	L-11	L-17	L-23	P-5	P-11
L-6	L-12	L-18	L-24	P-6	P-12
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				P-22	P-28
				P-23	P-29
				P-24	P-30

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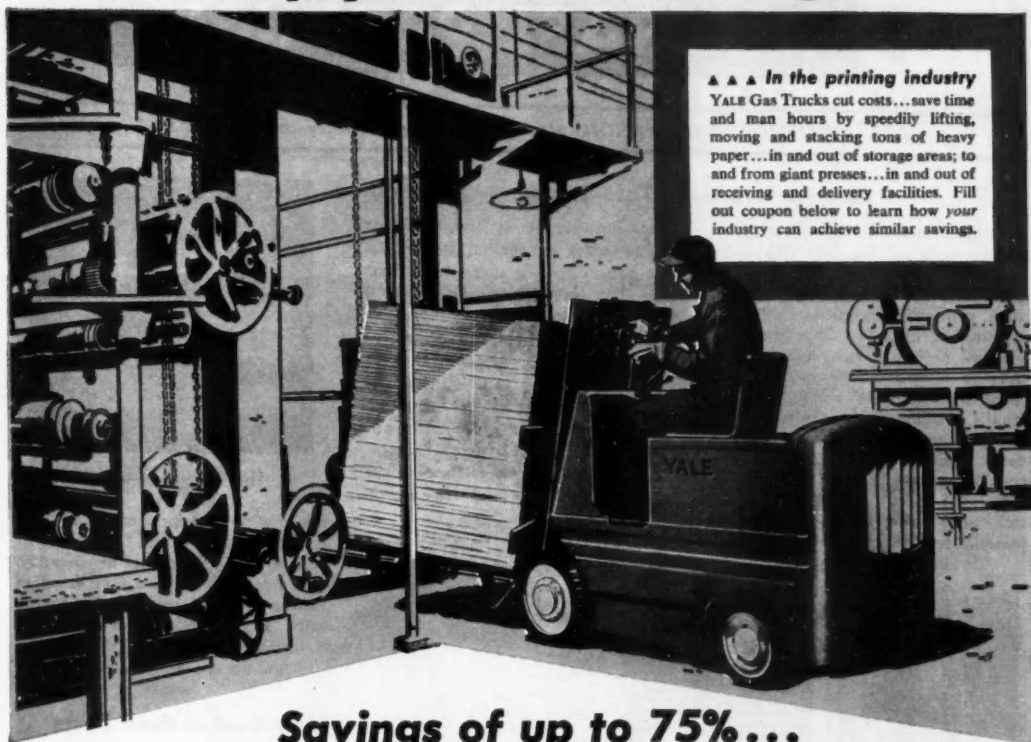
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In Canada write: The Yale & Towne Manufacturing Co., St. Catharines, Ont.

# YALE

**GAS AND ELECTRIC INDUSTRIAL TRUCKS • WORKSAVERS  
HAND TRUCKS • HAND AND ELECTRIC HOISTS • FUL-LIFTS**

# N

# AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

## Electric Hydraulic Test Stands

Aircraft hydraulic accessories, test stands, designed for use with Skydrol fluid, are now in production.

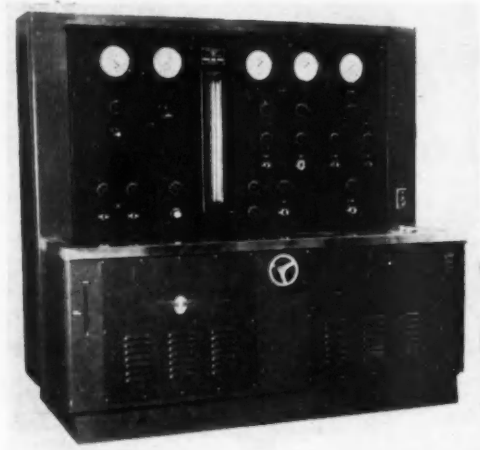
They are electric motor-driven units primarily designed to provide a source of hydraulic fluid pressure, with all necessary instruments, controls and panel outlets included for rapid and accurate testing of hydraulic system components operating at pressures up to 5000 psi and flows up to nine gpm in Model 6SE3V-9V and 20 gpm in Model 10SE3V-20V.

Multiple circuit outlets and control valves are provided to make it possible to test several components

simultaneously when the machines are used for production testing. A foot pump circuit is furnished so that static and leakage tests up to 10,000 psi may be performed.

Removable panels are provided in the front and rear of the cabinet to permit easy access to the interior of the machine for periodic inspection and service of the system components. All components of the system for each stand are housed within the cabinet assembly. *Greer Hydraulics, Inc.*

Circle P-1 on page 65 for more data



*Greer hydraulic test stand Model 6SE3V-9V.*

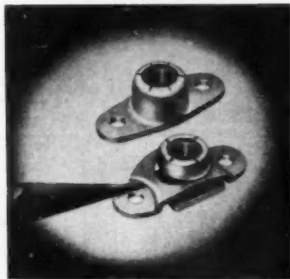
## Redesigned Floating Anchor Nut

Quick self-alignment and simplified assembly of aircraft components at reduced costs is said to be possible with the recently developed A-41 floating anchor nut. The maker claims weight savings of 1.3 lb per thousand pieces over earlier anchor nuts of this type.

Recent redesign of its old type floating anchor nut permitted the

manufacturer to give the A-41 unit smaller overall dimensions than were possible before. As a result, it is the same size as the firm's standard non-floating anchor nut and complies with all AN 366 dimensional and performance requirements.

A special feature of this part is the offset shoulder on the anchor lug which is said to assure full floating



*ESNA floating anchor nut.*

action of the nut by preventing interference between it and the two rivets holding the lug to a part or assembly.

The device contains a fiber or nylon locking collar to hold the nut on the bolt. *Elastic Stop Nut Corp. of America.*

Circle P-2 on page 65 for more data

## Mold-Sealed Fuse Posts

Designed to surpass military requirements, mold-sealed, watertight fuse extractor posts have been brought out.

Molded of black plastic, leakage is claimed to be prevented because top and bottom body contacts are actual inserts at time of molding. Rubber "O" rings seal the front panel, and knob seats squarely in molded-in shell.

One-piece terminals and welded joints are said to help eliminate voltage drop. The posts are designed for the firm's 3AG, 4AG, and 5AG series of fuses. *Littelfuse, Inc.*

Circle P-3 on page 65 for more data



*Littelfuse mold-sealed fuse posts.*

**THE WEATHER**—Mild cloud, but tonight is high overcast. Low overcast. Northern winds.

**MONTHLY TEMPERATURES**

6 a.m.	32	12 a.m.	32	6 a.m.	32
9 a.m.	32	3 p.m.	32	9 a.m.	32
12 a.m.	32	6 p.m.	32	12 a.m.	32

Source: *Weather Bureau*

Copyright 1932 by *Weather Bureau*

The Festagians' library lived in the Municipal library room and served to all girls, where they met to the Municipal library to celebrate. 2 or 3. Error:

**1. TON CONNECTION KMO** or  
push-against, chronic-allow cost  
won't be a total chrome-plated face.  
Narrow-lenses to a light-bell ring  
for quick access. Cines and Cines  
designed for greater flexibility in the

**1. TON CONNECTION KMO** or  
push-against, chronic-allow cost  
won't be a total chrome-plated face.  
Narrow-lenses to a light-bell ring  
for quick access. Cines and Cines  
designed for greater flexibility in the

**SEALED POWER CORPORATION, MUSKEGON, MICHIGAN**

## Sealed Power Piston Rings

## PISTONS • CYLINDER SLEEVES

# The BUSINESS PULSE

*Steel Makers Recover After Strike Settlement, But Effects Linger On.  
Lack of Adequate Supplies of Iron Ore May Slow Down Output of Steel  
Early Next Year. Price Index Shows Moderate Inflationary Tendencies*

This Survey Is Prepared  
Exclusively for AUTOMOTIVE  
INDUSTRIES by the Guaranty  
Trust Company of New York.

## Steel Stages Quick Comeback

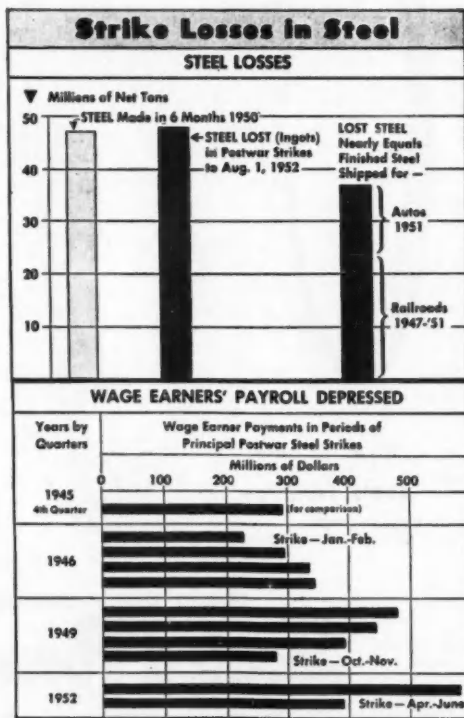
Steel production recovered very rapidly after the strike settlement and is now back on a normal basis. This quick comeback suggests less damage to the defense program than had been anticipated earlier, but even so the effects of the 55-day work stoppage are expected to linger on well into the coming year. The National Production Authority estimates that at least half of all steel inventories in the hands of manufacturers at the beginning of the dispute were consumed and points out that, even where plants have ample total stocks remaining, the exhaustion of just one key steel product can bring operations to a halt. That inventory imbalance or exhaustion became fairly widespread during and immediately after the strike is evidenced by the Defense Department's disclosures that some 300 defense contractors had been completely shut down by early August.

## New Control Directives

In order to assure a maximum flow of steel into essential defense projects, the Government has issued a number of new control directives. The NPA has ordered steel mills to set aside roughly one-fifth of their entire output, beginning October 1, to fill military, atomic-energy and machine-tool orders. It has also set up a new priority system for industrial expansion projects under which those designated as "critically important" for defense will have first call on available steel supplies, even if that means delaying starts for other projects already approved. At the same time the NPA has amended its regulations to permit manufacturers to buy all the used steel they can without charging it against their regular quotas, and it has liberalized the regulations governing the use of foreign steel so as to induce a greater flow of imports.

Complicating the steel outlook is the fact that the

Great Lakes iron-ore fleet did not operate during the strike. Despite special efforts now being made to speed the movement of iron ore by ship and rail, steel producers are fearful that the lake season will close before adequate supplies can be brought in to compensate for the strike-period loss. A failure to build up sufficient reserves before the onset of winter would probably slow output sometime early next year. Added to this uncertainty is the threat of a strike in the nation's coal mines at the end of September when current contracts between mine operators and John L. Lewis' United Mine Workers expire. At this writing discuss—  
(Turn to page 106, please)

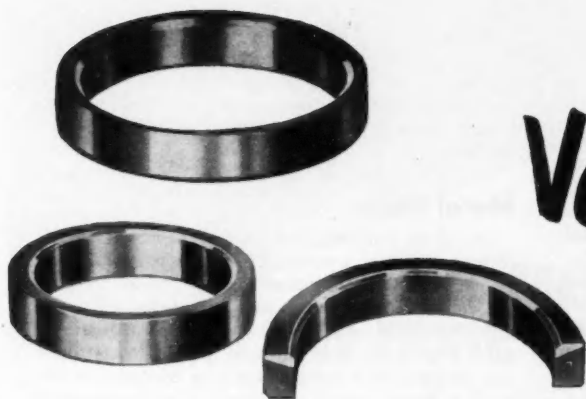


Source: American Iron and Steel Institute.



# Unique production processes build Extra quality into

## Eaton Valve Seat Inserts



Years of production experience and close engineering cooperation with leading engine manufacturers, combined with modern high-volume facilities, enable Eaton to furnish high-quality valve seat inserts to meet the specific requirements of the automobile, truck, and tractor industries. The range covers all types of inserts from low-priced, volume production passenger car inserts up to large-size, puddled-face inserts of suitable materials for large heavy-duty installations. A unique method of puddling special facing materials on insert seats enables Eaton to furnish inserts with superior corrosion and wear-resistant qualities at minimum cost.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.



### EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



**PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# AIR BRIEFS

By ROBERT McLARREN

## Business as Usual

Secretary of Defense Lovett has summarily dismissed the proposal of Aircraft Production Board acting Chairman William L. Campbell that most of our present, out-dated production aircraft be dumped overboard in favor of immediate top priority to existing and superior prototypes. Campbell had proposed that such aging models as the Grumman F9F, Douglas AD, Republic F-84G and Martin B-57 be cancelled immediately and that in their place such high-performance types as the Convair F-101, McDonnell F3H, Douglas A2D and Douglas RB-66 take their place on the assembly lines. Lovett bluntly charged that Campbell had little experience in the aircraft industry and that, furthermore, recommendations for procurement of specific types by a civilian agency carried little, if any, weight with the military. All of which means that the aircraft industry apparently will continue with its present production assignments at least until the 143-Wing program is attained in June, 1954.

## Big Jets

An analysis of available data on U. S. jet transport proposals indicates that the U. S. aircraft manufacturing industry is agreed on one point: the U. S. jet transport must be able to cross the Atlantic. All designs so far revealed are in the 200,000-lb gross weight category, all will carry 80 or more passengers, and all will be capable of non-stop Atlantic crossings with adequate reserves. This is an important shift in the heavily-screened U. S. jet transport picture which, for several years, contemplated principally a short-range domestic-type jet transport. Lord Douglas, BOAC chairman, recently pointed out rather happily that his trans-Atlantic deHavilland Comet II jet transport will be doing just that by late 1954. Meanwhile, first flight of the Bristol Britannia turboprop transport gives Britain yet another very long jump on U. S. competition. British European Airlines has 25 of the big, new transports on order. The long-awaited "super" transport will carry 104 passengers at 365 mph over distances of up to 4000 miles.

## Working Profs

Boeing Airplane Co., which has displayed great ingenuity in its engineer recruitment program, reveals that during the past summer it employed 71 professors from 44 colleges and universities during their summer vacations. This arrangement not only afforded

Boeing the use of their extremely valuable services, if only for the summer, but gave the professors valuable practical experience for incorporation in their lecture courses.

## Metal Boots

One of the problems that has plagued manufacturers of high speed jet aircraft is the near-impossibility of keeping conventional rubber de-icer "boots" in place on wing and tail leading edges at speeds up to 650 mph. Air loads are so severe at these speeds that even paint is stripped from surfaces. Lockheed has solved this problem with development of a combination aluminum, copper, silver and plastic sandwich material which is strong enough to take the air loads, smooth enough to comprise the leading edge of the surfaces without any drag increase, and resistant enough to withstand much higher electrical heating energies than heretofore possible. The result is a more intense heat for brief periods resulting in quicker ice dissipation.


## New Builder

The airframe manufacturing industry is welcoming a new member to its fraternity of complete military aircraft production: TEMCO Aircraft Corp. TEMCO has received a large quantity production contract for the McDonnell F3H Demon carrier jet fighter to augment scheduled production of the swept-wing fighter by McDonnell in St. Louis. TEMCO began life in November, 1945, when Robert McCulloch, division manager, and Bert Howard, division comptroller, of North American Aviation of Texas decided to keep the big Dallas, Tex., plant going after North American pulled out following complete V-J Day cancellation of its work there. Since then TEMCO has grown steadily in stature among the military services for its ability to get things done: aircraft overhaul, sub-assembly fabrication and aircraft modification. Now TEMCO has hit the big time with its F3H award and it seems certain that in the not-too-distant future TEMCO aircraft of its own design will be joining the armed forces.

## More Stretching

In addition to all of the "stretch-out" programs that have been piled one upon the other in the past year in military aircraft procurement, the services themselves

(Turn to page 90, please)



## AUTOMATIC

### FULL PROTECTION ALL THE TIME YOUR ENGINE IS STARTING OR RUNNING!

**AUTOMATICALLY CLOSES THE STARTING MOTOR CIRCUIT** from any remote source of control, such as manual switch, temperature, pressure, level, load, power failure, etc.

**INTERMITTENTLY CRANKS THE ENGINE** with "OFF" and "ON" periods of cranking until the engine starts.

**ALLOWS A CERTAIN LIMIT OF TIME FOR CRANKING** the engine to get it started, thus saving the battery and starting motor from damage.

**INSTANTLY BREAKS THE STARTING MOTOR CIRCUIT** when the engine fires.

**CONNECTS AND DISCONNECTS THE CIRCUITS** to ignition, fuel valves, chokes, magneto, throttle, solenoids, etc.

**SHUTS DOWN THE ENGINE** and cuts off the battery and ignition or fuel on diesels in case of an abnormal op-

erating condition, such as failure to start, failure of fuel supply, failure of ignition, failure of oil pressure, or overheating of cooling system. Any number of additional safety switches, such as overspeed, fuel supply, oil level, load, temperature, pressure, etc., may be added.

**CLOSES THE CIRCUITS FOR ALARM** and signals in case of engine failure. When an auxiliary standby engine is provided, this same circuit can be used for automatically starting this engine to take over in place of the one that failed.

**EMERGENCY SIGNALS AND ALARMS** remain "ON" until shut off by attendant, at which time the Control Set automatically RESETS itself for another start. Individual signals show cause of shutdown.

**ADDITIONAL TERMINALS** and indicating signals can be furnished for overspeed governor or any number of safety switches at a slight additional cost.

*Automatic Engine Control Equipment*

# Time Saving Method for Tapering Aircraft Skins

**A** NEW method of tapering aircraft skins through the use of abrasive belts has been disclosed recently by the Carborundum Co., Niagara Falls, N. Y., and the Bell Aircraft Corp., Buffalo, N. Y.

The process involves the use of a wide-belt machine to which certain modifications have been made. Using a wide abrasive belt in conjunction with a "61" rubber-

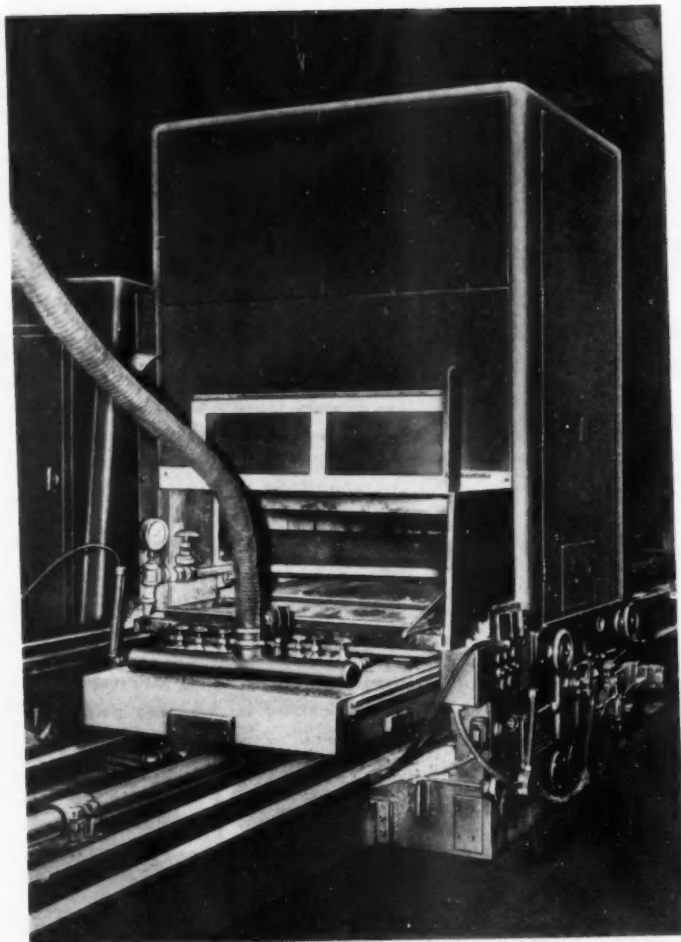
faced contact roll by Carborundum, cuts up to 0.1 in. in depth can be taken over the entire width of aluminum sheets up to 72 in. in width. Moreover, the subsequent operation of polishing the aluminum sections can be handled on the same machine through a change of the abrasive belt to one of finer grit, thus further reducing over-all production time.

Carborundum's new process, tested with the help of Bell Aircraft, is said to have shown that varying tapers can be generated easily with this abrasive belt method and that finished skins can be produced at a considerably faster rate than heretofore.

As in other machining methods, the ground chips from the abrasive method are salvable and have the same value as other aluminum chips. The capital investment required for the abrasive belt machines is relatively low in comparison to that for machines utilizing existing methods.

With the abrasive belt method, tolerances of  $\pm 0.005$  in. are easily realized and can probably be bettered. Finishes to 10 micro-in. rms are achieved with the fine grit belts. The new abrasive belt method keeps the work temperature below 100 F, hence no metallurgical changes take place in the material. A vacuum chuck is used to hold the aluminum sheet in place.

Under actual test conditions, abrasive costs are said to be from 12 to 15 cents per lb of aluminum removed. Under production conditions, it is believed that costs of the new Carborundum method can be further reduced.



*Modified wide-belt abrasive machine used in the Carborundum Company's new method of tapering aircraft skins.*

# Delpark

# Studebaker

Cleaner, trouble-free grinding operations, speed production, save money at the Studebaker Corporation Plant in South Bend, Indiana.

Delpark Filters insure clean coolant in grinding operations . . . permit freer cutting wheels, lengthen coolant life, and eliminate downtime of grinders for cleaning of reservoirs. By supplying clean coolant, machine efficiency is increased, less wheel dressing is required, wheel life is lengthened and greater grinding accuracy is achieved.

Removal of hot particles lowers coolant temperature, retards deterioration. Coolant remains clean, delays coolant becoming rancid.



*This Delpark Filter serves as a central system for four centerless grinders. The coolant flow is 120 gallons per minute.*

LET A DELPARK INDUSTRIAL FILTERING SPECIALIST SHOW YOU THE FACTS ON THE FINEST IN INDUSTRIAL FILTRATION.

*Write for more complete information.*

# Delpark

## INDUSTRIAL FILTRATION

*Backed by 30 Years Experience in Industrial Filtration*

PATENTS  
PENDING

INDUSTRIAL FILTRATION COMPANY

LEBANON, INDIANA



**PIERCE-built...**

**for Exacting Performance**

## Pierce experience and production facilities are available to YOU

Precision fuel control equipment, shown above, are vital mechanisms . . . built by Pierce to equip America's finest turbo-jet aircraft engines. Tolerances in some cases are close as 70-millionths of an inch. Extremely sensitive performance requirements demand flawless workmanship and quality control of the highest order.

Pierce facilities and experience are available to you . . . in the manufacture of high production small mechanical assemblies (machine work and assembly) . . . precision machining of mechanism castings and fabrication of small stamped parts and assemblies.

Your inquiry will receive immediate attention.  
Write to Chief Production Engineer,  
**The PIERCE**  
**GOVERNOR CO., Inc.,** Box 1000, Anderson, Indiana

"World's Most Experienced Governor Manufacturer"

## MEN in the NEWS

(Continued from page 25)

General Motors Corp., United Motors Service Div.—**Edward L. Lape** has been made assistant general merchandising manager.

Kaiser-Frazer Export Corp.—**Charles A. Watson** is now general manager.

Pacific Airmotive Corp., Manufacturing Div.—**Anthony J. Kreiner** was recently appointed manager, while **E. L. Black** is administrative assistant.

Wagner Electric Corp.—**J. C. Evans** has been promoted to assistant controller.

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**Richard T. Nalle, Jr.**, was recently chosen manager of production.

Boston Woven Hose and Rubber Co.—**Whiting N. Shepard** is now director of sales.

Lord Manufacturing Co.—**Richard C. Henshaw** has become manager of engineering.

Minneapolis-Honeywell Regulator Co.—**John R. Lenox** has been selected as director of aero manufacturing.

E. W. Bliss Co.—**H. C. Splittdorf** is now credit manager.

Houdaille-Hershey Corp.—**Frank T. Downs** has been appointed manager of sales.

National Automotive Fibres, Inc.—**John G. Bannister** was recently made sales manager.

Garrett Corp.—**W. C. Whitehead** was elected executive vice president a short time ago.

Fansteel Metallurgical Corp.—**Charles Kuhn** has been appointed sales manager.

Westinghouse Electric Corp., Steam Div.—**Donald R. Jenkins** has been appointed manager of the newly-formed gas turbine application engineering section.

Superior Coach Corp.—**William G. Lore** was named personnel manager recently.

(Turn to page 112, please)



# "Made for Each Other!"

## **SERVICE PISTON RING SETS BY MUSKEGON ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!**

This set of service piston rings was designed and produced in the same way as the original rings—for a single, specific engine!

These rings are not simply an "all-purpose" set suitable for just any engine. They and their respective engine were truly "made for each other" by close collaboration of the car manufacturer and Muskegon Piston Ring Company. In this way, and in this way only, can service piston rings enable an engine to deliver its full measure of economy and power.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.

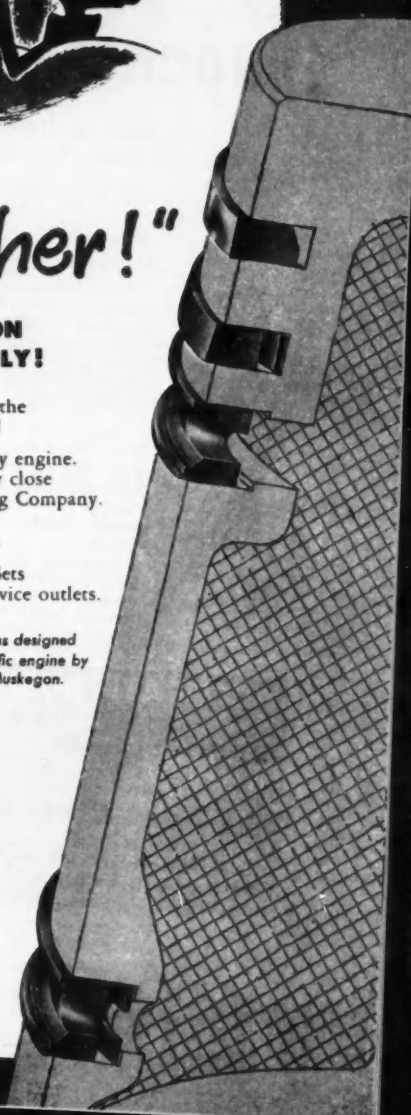
*This set of service rings was designed especially for a specific engine by the engine maker\* and Muskegon.*

**Piston Rings**

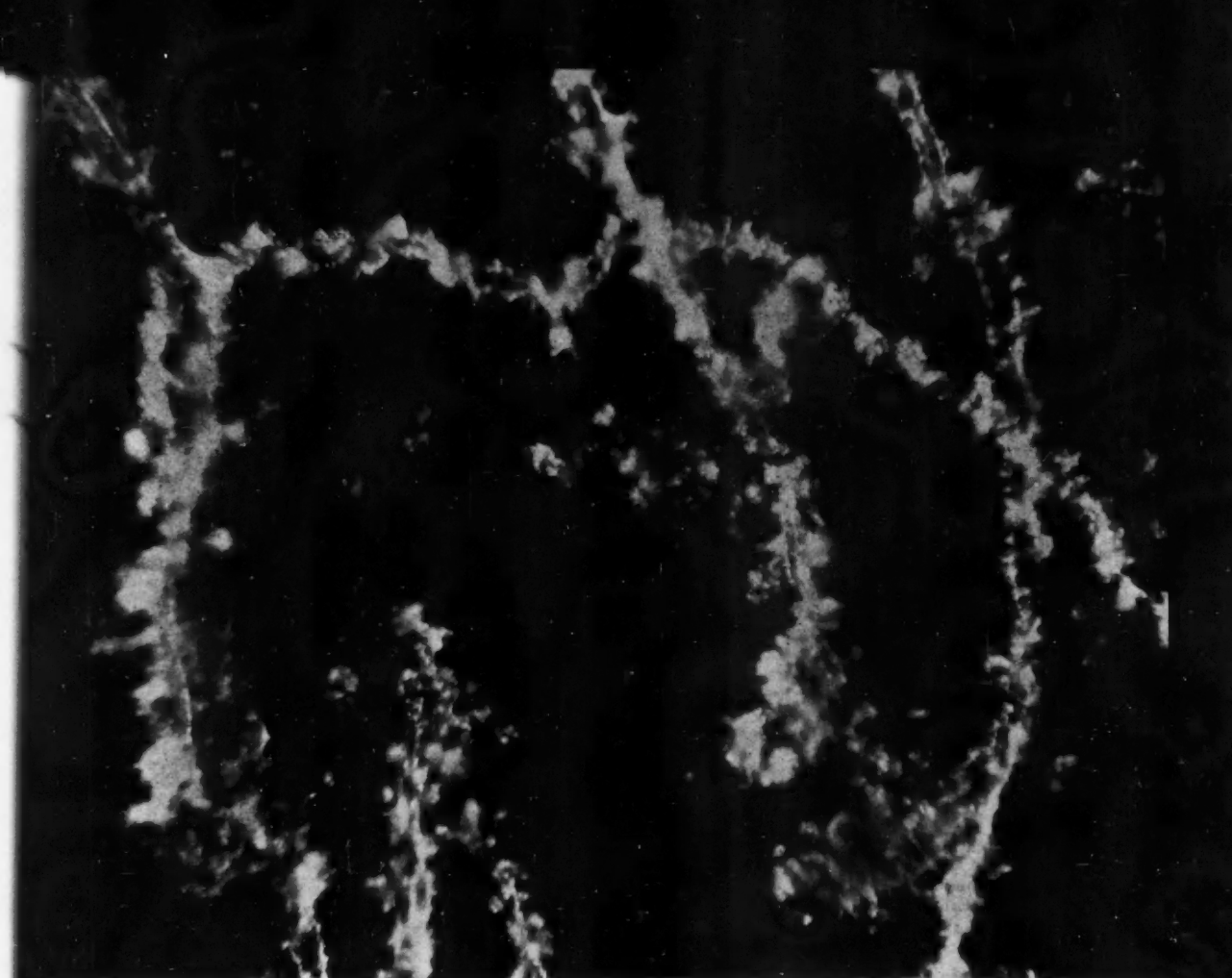
**MUSKEGON PISTON RING CO.**  
MUSKEGON, MICHIGAN  
PLANTS AT MUSKEGON AND SPARTA  
"THE ENGINE BUILDERS' SOURCE"

\*Name on request

Copyright 1952 by Muskegon Piston Ring Company







## Here's the secret of a tight seal

The picture above is a microphotograph of Armstrong's new Accopac® gasket material. It reveals one big reason why Accopac is the most effective plant fiber gasketing material yet developed.

**Uniformity the key.** The microphoto shows how each fiber in an Accopac sheet is completely and evenly covered with rubber latex saturant. Such complete fiber coverage is made possible by a new patented beater saturation process used by Armstrong.

Not only is the rubber coating on each fiber uniform and accurately controlled, but the new process actually permits a greater relative amount of rubber to be deposited on the fiber.

**Cork adds high compressibility.** The use of adequate amounts of finely ground cork in Accopac is another important reason for its outstanding performance. Cork gives the new material great compressibility.

In lightweight constructions, Acco-

pac conforms to normal irregularities without distorting flanges between the bolts. On rough, heavy flange surfaces, it fills ordinary imperfections to provide a tight, dependable seal, yet will not crush under heavy loads.

**Crush resistance, dimensional stability.** Accopac has very high crush resistance. Repeated tests prove that Accopac can withstand loads up to 100,000 p.s.i. without damage. By contrast, conventional plant fiber sheets often rupture under 25,000 p.s.i.

Accopac resists both shrinking and growing. This is important not only in service but also when it is used for replacement gaskets. Even after months of storage, Accopac gaskets still fit, still are flexible and resilient.

**Users report: "No leaks."** Arm-

strong's Accopac has had over two years of rigid field testing. Here are some typical comments from users:

"Completely eliminated oil seepage"—Tractor pan gasket.

"Eliminated leaks which were common with our old plant fiber gasket"—Water pumps.

"Accopac is the only fiber material that gives positive assurance of no leaks"—Gear case gasket.

"100% assurance of tight joints"—Oil valve.

**GET SAMPLES NOW.** Accopac materials come in sheets, rolls, ribbons, or die-cut shapes. For samples, call your Armstrong representative or write to Armstrong Cork Company, Industrial Division, 5809 Arch St., Lancaster, Pennsylvania.



# ARMSTRONG'S ACCOPAC

# The Parking Puzzle

(Continued from page 35)

revenue bond issue, produced a 60-page prospectus in attractive booklet form which covers some of the various subjects more extensively. Pittsburgh issued a 36-page detailed prospectus and made a 76-page engineering report available to those interested, plus other printed matter relative to agreements of the city's Parking Authority.

## Multi-Story Parking

The parking problem would be much more simple were it not often necessary to take to the air. In smaller cities parking lots usually may be acquired in sufficient number and size, and in good locations, to meet needs. But even some small cities, such as Ann Arbor, have found it desirable

to increase the efficiency of land use by building parking structures.

In larger cities there is little choice. Not enough parking lot space can be found near principal destinations without wiping out large areas of business property. Costs of land are so high use of it for parking is impractical unless multi-story structures are erected.

Since construction of parking buildings nearly always requires loans or bond financing, it is of extreme importance to have efficient, economical design. Open-deck ramp garages are commonly constructed, yet with self-parking these rarely exceed four stories above ground because of customer resistance. Under attendant parking they may go several stories higher. Noteworthy is the increasing use of underground space. San Francisco (second project programmed), Los Angeles, Kansas City, Kan., Phoenix and Pittsburgh have projects utilizing sub-surface space either programmed, under way, or nearing completion.

To get the most out of the space available, inventive minds have produced several types of mechanical parking garages which utilize much of the space otherwise occupied by ramps. These pioneering projects are described in the main body of the report.

## Attendant Vs. Self-Parking

In ramp garage operation, parking by attendants has become an increasing expensive overhead cost. That condition, plus difficulty of getting attendants, has led to the design of structures where either attendant or self-parking can be used. Under self-parking, capacity is materially reduced since aisle and reservoir space cannot be utilized for parking, and since more space must be left between vehicles.

Self-parking, however, is generally used in department store garages where parking is either free or of low cost. A mid-western department store which recently dropped attendant parking in its 500-car lot calculates the annual saving at \$25,000 in reduced labor and insurance costs.

## The Parking Authority

A recent addition to the city government function is the parking authority, of which at least 54 have been authorized in 20 different states and the District of Columbia. Of those authorized, some 35 have been created.

Parking agencies have a variety of

## ONE OF AMERICA'S PRINCIPAL PRODUCERS OF DRILL JIG BUSHINGS

# ANNOUNCES



## Precision Quality Piercing Punches

of premium steel, in two basic types:  
Water Hardening Tool Steel — and High Speed Steel

The high quality performance of a punch depends upon:

- (a) The Correct Quality Steel
- (b) Precision Heat Treatment to gain full advantage of its properties
- (c) Qualified Workmanship to insure dimensional accuracy

To these basic requirements must be added modern equipment to make possible production at reasonable prices. We have taken every possible step to produce an outstanding punch.

The water hardening tool steel we have selected is guaranteed to definite standards of grain size and depth of hardenability. For "shock absorber" action, the head and upper part of the shank are drawn back to 45-50 Rockwell C in such manner as to have a hardness gradient, rather than a sharp line of demarcation between different sections.

The underside of the head is ground slightly at the same time as the shank. This insures squareness of the underside of the head with the shank, and minimizes breakage during stripping.

**RELATED CONCENTRICITY**—As a further example of the "built-in" qualities of A.B.C. Precision Punches: the point is ground concentric with the body, within .0005" total indicator reading.

To achieve these A.B.C. advantages, plus fine finish and smoothly blended radius to minimize stresses, we developed within our own organization special grinding fixtures and dressing equipment not found in outside markets. And, back of all this is our long record as one of the country's principal producers of premium quality drill jig bushings and fine precision parts for the automotive and other industries.

## ACCURATE BUSHING COMPANY



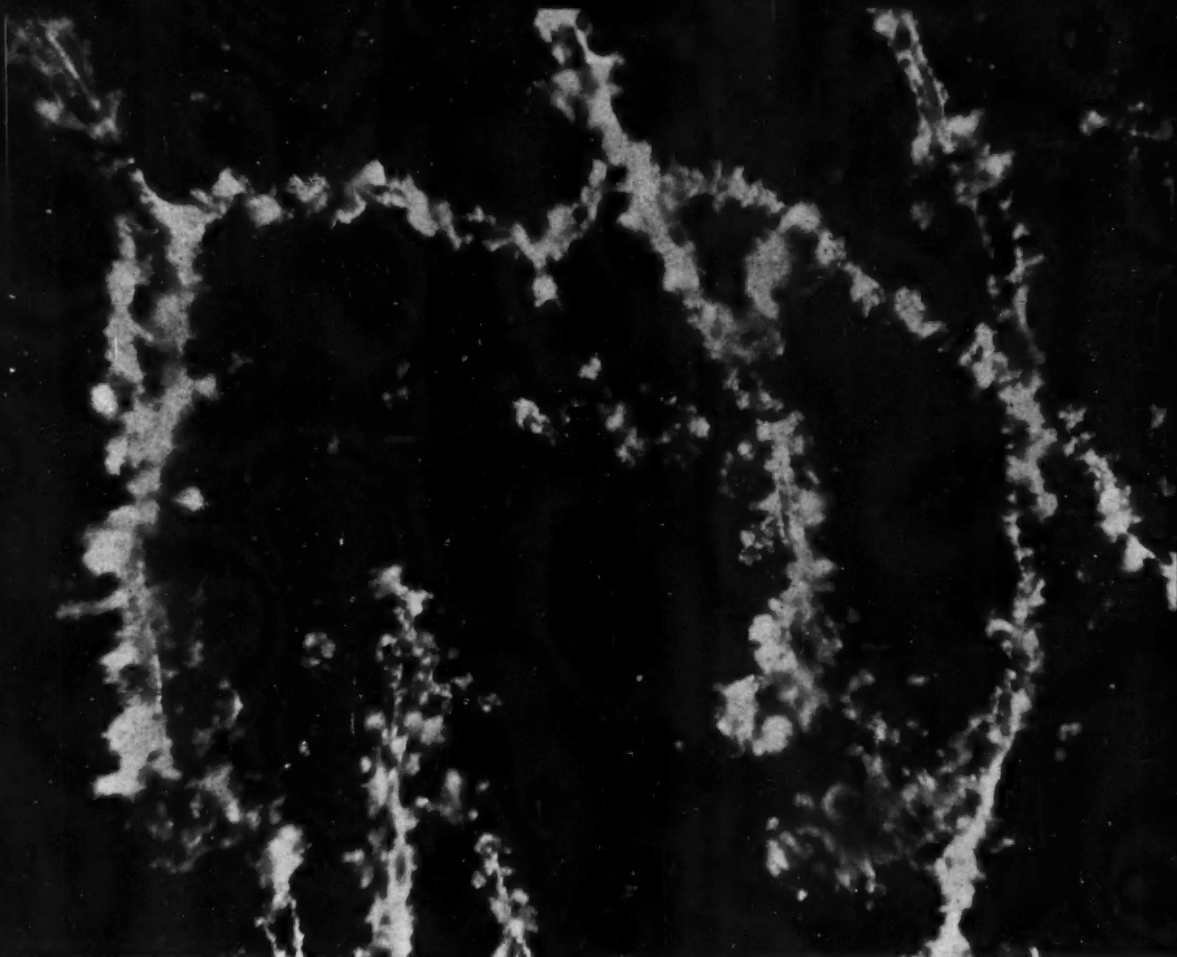
432 North Lincoln, Chicago, Ill. 11

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REPRESENTATIVES IN ALL IMPORTANT INDUSTRIAL CENTERS  
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## Here's the secret of a tight seal

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# ARMSTRONG'S ACCOPAC



# Strictly for Profit CHOOSE CLARK

Solely on the basis of *benefit to your business* take a thoughtful look at the Five Factors of Profit built into Clark machines:

1. **TIME PROFIT**—Materials move faster, and in synchronized flow. Man-hours for loading and unloading are reduced drastically.
2. **SPACE PROFIT**—Idle space becomes profitable storage capacity.
3. **TURN-OVER PROFIT**—Speeding up the production cycle improves the inventory picture, conserves working capital.
4. **MANPOWER PROFIT**—Human productivity is sharply increased to offset shrinking manpower. Workers prefer the better jobs.
5. **SERVICE PROFIT**—Prompt, efficient service, provided by Clark's nationwide organization. *Keeps equipment working.*

Any way you look at it, your Clark investment gets you a solid, profitable "most for your money."



There's a most profitable time to look into it—**RIGHT NOW!** All the literature items are designed for your profit. Please use the coupon to order them.

**CLARK** ELECTRIC AND GAS POWERED  
**FORK TRUCKS**  
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS






INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK • MICHIGAN

Please send: ☐ Movie Digest ☐ Safety Saves ☐ Basic Facts  
☐ Material Handling News

Name \_\_\_\_\_

Firm Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

forms. Some are restricted to an advisory capacity. Some have both city council and citizen members; some are composed of citizens only. About 20 have the powers of eminent domain and of issuing bonds.

## Spotlights Problems

It is generally agreed, regardless of limited or broad responsibilities, the parking agency does have a stimulating effect in attacking the problem. With its work confined to the single subject, the parking agency can obtain a focus of attention and action otherwise difficult to get.

Growth of the parking authority method\* is indicated by the fact that all of those functioning now were created in the few years since the conclusion of World War II, with the exception of that in Washington, D. C. Cities which have approached their bonded debt limitations and cities that cannot issue revenue bonds in their own names may find the parking authority an essential tool.

Detailed information on parking authorities and on allied matters is to be contained in two publications of the Highway Research Board, Washington 25, D. C. To be published this year, they are: "The Effectiveness of Parking Agencies," and "Trends in Legislation for Off-Street Parking Facilities."

## Parking Through Zoning

Since cities cannot be rebuilt in one gigantic program to make them better suited to transportation demands, more and more are adopting zoning ordinances which aim over the years to gradually produce more efficient land use and provide essential parking space throughout the city.


Nearly 200 cities of all sizes now have zoning ordinances which require provision of off-street facilities as new structures are erected. Many of the ordinances, however, have requirements which bear little or no relationship to the needs of a given size or type of structure.

## Model Ordinance Is Available

An excellent guide to the many problems confronted in adopting such an ordinance, or in revising an old one, is "Zoning for Parking Facilities," Bulletin No. 24, Highway Research Board, Washington 25, D. C. This study reviews ordinances adopted, and presents a model ordinance.

## Economics of the Problem

The parking problem has been recognized as an important one for at



How the casting

of a camshaft saved industry

**\$42,000,000!**

Only a few engine builders realized back in 1932 that Campbell, Wyant and Cannon really had something in the *cast* camshaft. Since that time, many others found that CWC's casting process could make important cost reductions and together they saved over \$42,000,000. Together they bought from CWC 33,000,000 cast camshafts!

CWC cast camshafts are *produced* at a lower cost! Made of electric furnace alloyed metal, they require *less* machining and *easier* machining. They permit unrestricted engine design—positive control of Brinnell specifications—eliminate heat treating—and resist corrosion and wear. Regardless of the number of engines you make—the same proportionate savings can be yours with CWC cast camshafts!

**CAMPBELL, WYANT AND CANNON**

FOUNDRY COMPANY

Muskegon, Michigan

**CWC**

Since 1908

**METALLURGICAL ENGINEERING** provides unlimited possibilities in product design

**PRECISION CONTROL** assures the desired casting

**MECHANIZATION** to produce castings at reasonable cost

PHOTO COURTESY  
GENISCO, INC.  
LOS ANGELES, CALIF.

## ENGINEERS NOTEBOOK

### Coupling Provides Easy Cleaning Feature on Oil Separator

The Genisco Oil Separator for recovery of oil in vacuum exhaust systems employs a standard Marman V-Band Coupling between major components. Marman's patented Quick Coupler Latch allows instantaneous disassembly of the unit for easy cleaning and provides a leakproof seal which has been tested at 60 p.s.i. It easily accommodates all conditions of temperature and vibration found in transport aircraft.

The Marman V-Band Coupling is a standard design with all the advantages of low cost, quick delivery and easy specification. Its versatility enables it to accommodate many diversified and highly specialized applications. These famous couplings have become familiar items to our production people everywhere and fly on all the planes of the U.S.A.

FOR ADDITIONAL INFORMATION,  
WRITE FOR ENGINEERS' NOTEBOOK #20A

**MARMAN**  
PRODUCTS CO., Inc.  
11214 EXPOSITION BLVD.  
LOS ANGELES 64, CALIF.

SAVE COST  
TIME AND  
WEIGHT  
WITH  
MARMAN

STANDARD CLAMPS FOR SPECIAL APPLICATIONS

least a quarter of a century. Not until recently has attempt been made to place the problem under the microscope to obtain a reasonably accurate picture of the elements that make up the problem and of the economic impact of supplying or failing to provide needed facilities.

### Economics Study Under Way

To fill this need a two-year study has been launched through the Highway Research Board of the National Academy of Sciences with staff assistance of the U. S. Bureau of Public Roads. The survey is financed with funds made available by the petroleum and automotive industries through the Automotive Safety Foundation. The work is being guided by an advisory committee composed of representatives of business, retailers, property owners, industry, highway users and government—all who have an important concern in the problem's solution.

In a statement issued by the Board to describe the study it is stated: "The many-sided survey is designed to supply factual answers to such questions as the effect of off-street parking shortage on down-town property values and taxes; on volume of trade in the business center; on street congestion; and on full use of the family car. It will also seek to determine whether sufficient off-street parking at moderate cost can be provided to satisfy the demand, and how such facilities can best be financed."

Research has been undertaken on different phases of the work by the University of California, Ohio State University, University of Michigan, and the University of Washington.

Those involved in the study point out that when the research is completed it should be possible to appraise more accurately the benefits which current programs will bring, and to better gauge future programs.

\* Among the cities with parking authorities are: Little Rock, Ark.; San Francisco, San Jose, Modesto, and Santa Monica, Calif.; Wilmington, Del.; Washington, D. C.; Joliet and La Grange, Ill.; Indianapolis, Ind.; Augusta, Me.; Baltimore, Md.; Grand Rapids, Lansing, Detroit and Flint, Mich.; Paterson, Passaic, Jersey City, New Brunswick and Hackensack, N. J.; New York City, Elmira and White Plains, N. Y.; Charlotte and Wilmington, N. C.; Cincinnati and Columbus, O.; Portland, Ore.; Pittsburgh, Philadelphia, Lansdale and Uniontown, Pa.; Milwaukee and Madison, Wis.



# Production Pointers

from

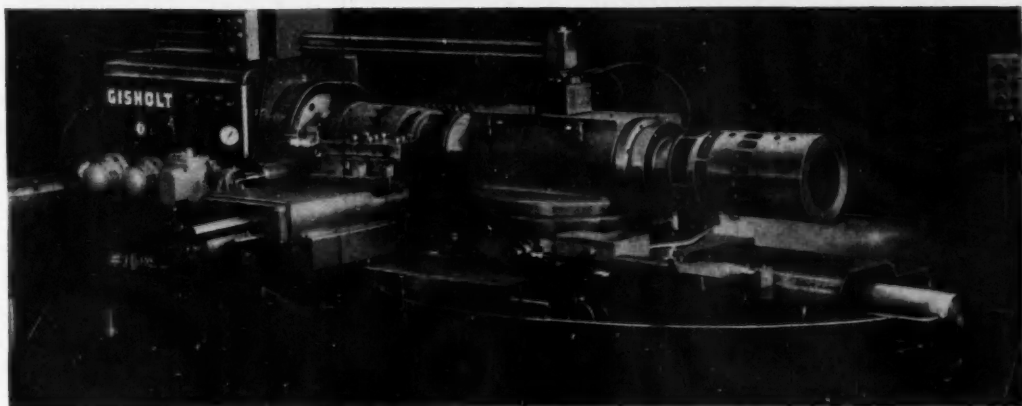
# GISHOLT



TIME-  
SAVING  
IDEAS



*Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.*



No. 24 Hydraulic Automatic Lathe with special turret having two mandrels.

## PIVOTING MANDRELS END LOADING TIME LOSS

### No. 24 Hydraulic Machines One Part While Another Is Loaded

In this interesting production pointer, loading time is actually part of *machining* time—with one workpiece being put on the lathe or taken off while another is being machined.

The part is a diesel engine cast-iron cylinder liner and the machine is a No. 24 Hydraulic Automatic Lathe which has two identical expanding mandrels on an indexing carriage. Twin arbors are mounted 180° apart with ratchet teeth for driving.

#### Single Automatic Operation

The automatic cycle begins with carriage moving forward until the arbor engages driving teeth in the spindle nose. This brings in the front and rear slides carrying a total of 28 tools which machine all outside diameters, faces and chamfers. With cuts completed, the tool slides retract, the

work carriage traverses back and automatically indexes the new workpiece into position.

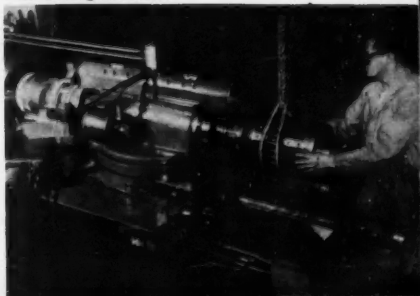
This feature achieves important savings in time and added production. With a finished liner being unloaded and new workpiece put in place *during* machining, loading and unloading time are absorbed in the machining cycle. Hence, the machine spends most of its time making chips. The only lapsed time between machining is for traversing up, back and for indexing—less than half a minute! Machining time for this liner—and other sizes handled on other No. 24 Hydraulics—is below 3 minutes . . . good reason why this manufacturer standardizes on the efficiency of the No. 24 Hydraulic Automatic Lathe for these operations.

**With Twin Mandrels This No. 24 Hydraulic Provides Continuous, Fast Production with No Lost Loading Time.**



Machined cylinder liners.

Operator loads new workpiece while another liner is being machined.







TIME-  
SAVING  
IDEAS

## FOR MORE PRODUCTION FROM

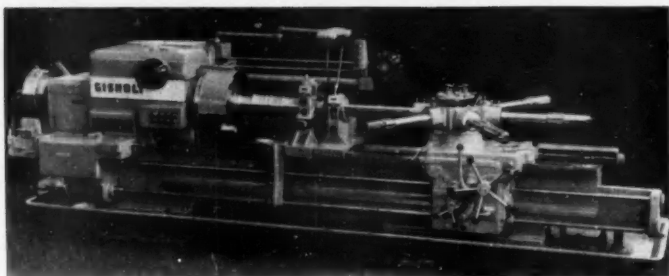
### HOW THIS DIFFICULT BORING JOB BECAME AN EASY ONE . . . MORE ACCURATE, TOO

#### Saddle Type Turret Lathe Is the Answer

Here's the kind of job that qualifies as a tough one, any day. Yet see how this turret lathe takes it in stride. The part is an alloy steel propeller shaft measuring 36½"—with various inside diameters to be machined.

A standard 2L Saddle Type Turret Lathe is "tailored" for the assignment: In place of the side carriage there is a quick-clamping steadyrest and boring bar support. For safety and convenience, the handwheel for the Hydraulic Speed Selector and the emergency push-buttons are duplicated at the working position.

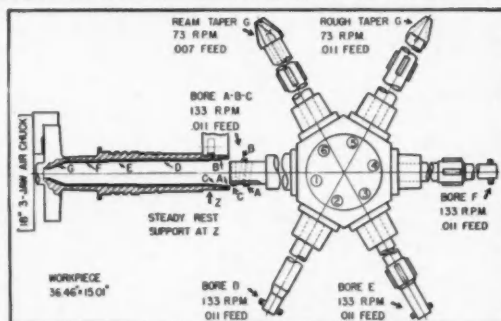
As shown in the layout, seven different internal surfaces are handled. One of these is the taper bore which is rough and finish reamed. Coolant flows through the boring bars directly on the tool bits. Floor-to-floor time with this well planned setup is 30.5 minutes with a high degree of accuracy, proving again that tough jobs can be easy ones on a Gisholt Saddle Type Turret Lathe.



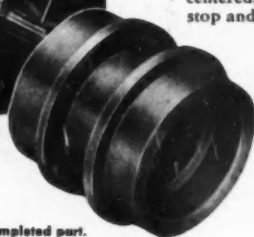
Good setup for deep boring. Note added steadyrest and boring support. Also duplicate controls.

Tooling layout  
for boring  
propeller shafts.

**This Saddle Type Lathe Completes All These Difficult Interior Surfaces in One Chucking.**



This close-up shows simultaneous operations on clutch part from both turrets.



Completed part.

### "UTILIZING EVERYTHING BUT THE SQUEAL"

#### Hard Working Ram Type Lathe Setup for Clutch Parts

This job leaves nothing to be desired from the standpoint of efficiency. Everything on the lathe is busy . . . and that's good! The machine is a No. 5 Ram Type with standard hydraulic bar feed and collet chuck and its business is producing 2¼" sliding clutch shifters. Here's how it does it:

1. Stock is moved out to length and centered, using combination stock stop and starting drill.
2. Counter-bore and small bore are drilled from the hexagon turret while both hubs are turned from square turret.
3. Center recess is formed from square turret and the end is then faced from rear tool post.

4. Grinding relief is turned (both sides of center recess) from square turret.
5. Small ID is finish bored and reamed from hexagon turret.
6. Counterbore is finished from hexagon turret and cut off from square turret.

Floor to floor time is 7 minutes—with every minute of the way made easy for the operator by these Gisholt features which provide: 1. Shifts to new spindle speeds by a simple twist of the Hydraulic Speed Selector. 2. Proper spindle speed for reaming the small ID by merely tapping the Hi-Lo lever. And, 3, ease of changing feed by setting a single dial-type lever.

**A Splendid Example of Well Planned Tooling and Simultaneous Machining from Both Turrets — Gives Maximum Efficiency to This Ram Type Turret Lathe Job.**



LOOK AHEAD . . . KEEP AHEAD . . . WITH GISHOLT



TIME-  
SAVING  
IDEAS

### A ONE-MAN, TWO-MACHINE TEAM

#### Gear Blank Savings Are "Automatic"

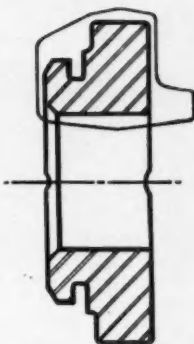
It's a case of perfect teamwork... the way these two 2F Fastermatic Automatic Turret Lathes turn out gear blanks. Splitting the job accounts for important savings in time, money.

**First machine:** With the steel forging held on the chucking hub, three passes are taken through the bore and two passes across the face, then rough turn and chamfer—all handled from the turret. Rough and finish grooving is done by tools on the independent front and rear cross slides. Time: 5 minutes.

**Second machine:** Part is held in the bore while turret tools remove chucking hub, semi-finish and finish the various diameters and chamfer. The two cross slides complete the rough and finish facing. Time: 3 min.

Not only is gear blank production made fast by this two-machine setup, but it's planned for real economy with one operator tending both lathes. Moreover, with the chance for human error eliminated by the automatic operation of the Fastermatics, there's assured accuracy with true concentrics and parallels.

For gear blank work—or any kind that belongs on an automatic turret lathe, investigate the Fastermatic.

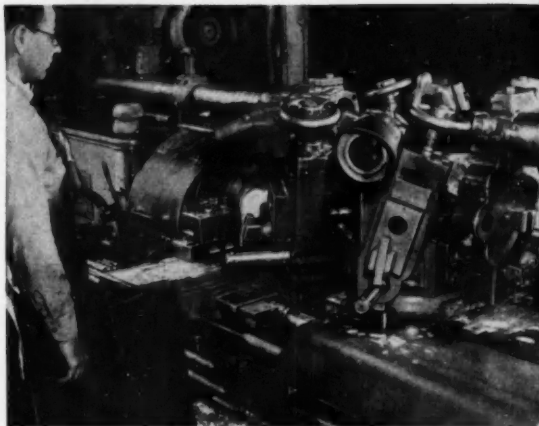


Operations required to finish gear blanks. Light line indicates rough forging.



Rough forging and completed blank.

**On This Gear Blank Job, Operator Is Needed Only for Loading and Unloading—the Two Fastermatics Automatically Perform All Work.**



First operations on gear blanks are performed by this Fastermatic.

### PUTS FINISHING TOUCHES TO CRANKSHAFTS — BUT FAST

#### Simplimatic Does Neat Job on Counterweights

Crankshafts always make interesting machining jobs. On this one, for a V-8 engine, a Simplimatic Automatic Lathe takes care of the six counterweights. Here's the setup:

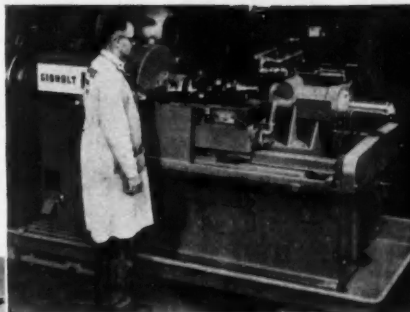
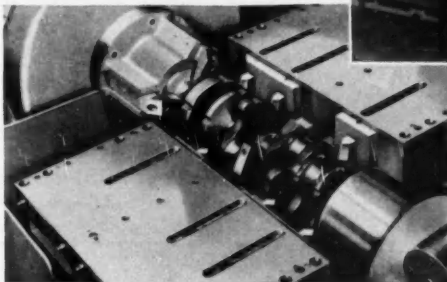
The 25½" crankshaft is held in a special pot-type chuck and driven from a slot in the flange. The oil seal bearing surface rests in a half bearing and is clamped with two jaws. There's a steadyrest at number three main bearing for support. Number one main bearing is held in a tapered, slip-fit bushing in the tailstock.

Three tools each in both the front and rear slides turn all six counterweights and generate chamfers ¼" by 45 degrees. Floor to floor time is 1.66 minutes, using H. S. S. cutting tools. The sliding tool holders, a precautionary feature for this job, retract into master blocks after cycle is completed, thereby providing loading clearance and tool protection.

**All Crankshaft Counterweights Are Turned and Beveled in a Single Automatic Operation by the Simplimatic.**

#### JUST OFF THE PRESS!

An entirely new Simplimatic catalog is ready—complete with the information and specifications you want, pictures and job facts. Write today!



▲ The Simplimatic with part ready for loading. Tool blocks at this point are retracted for clearance and tool protection.

▲ Close-up of the workpiece and tooling. Note steadyrest for center main bearing.





TIME-  
SAVING  
IDEAS



## HOW MAINTENANCE BALANCING PAYS FOR ITSELF

Southern Railway Company Adds Life to Diesel-Electric Equipment

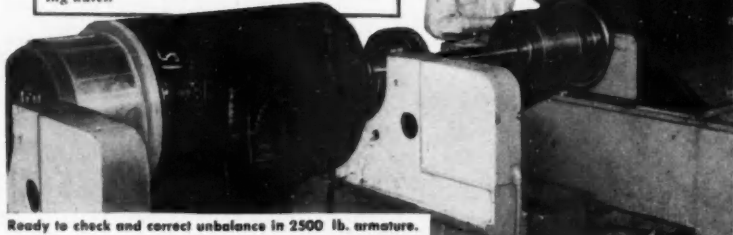
Southern Railway Company is doing it, too. In its Pegram Repair Shop, Atlanta, they are getting even greater efficiency and performance from diesel electric locomotives—through balancing. A 6U DYNETRIC Balancer handles balancing in the maintenance of traction motors and generator armatures.

An example is this traction motor armature. Measuring 4 feet long and weighing 2500 lbs., dynamic unbalance is located and measured to an accuracy of 1/4 ounce inch. Corrections are made by welding small steel blocks on the core while the armature is still in the balancing machine. A final check for accuracy and possible operator error is then made.

On this large electrical part, the entire operation—setup, loading, checking, correcting, rechecking and unloading—only requires about one hour. Yet, this accuracy of balance—with smoother, vibrationless operation and lessened bearing wear—pays off in far longer life between overhauls, returning balancing costs many times over.

If maintenance of electrical equip-

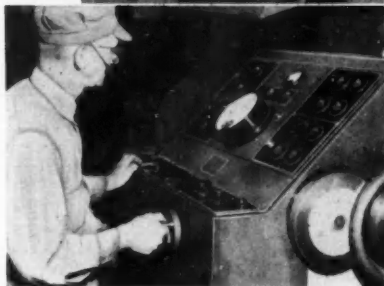
ALL MATTERS OF BALANCING, maintenance and production balancing are covered fully in the Gisholt Balancing School. Write for details, starting dates.



Ready to check and correct unbalance in 2500 lb. armature.

ment is a problem of yours, ask for the article on balancing applications in railway shops. With it we will include the book *Static and Dynamic Balance*, which thoroughly covers the entire field of balancing.

**Precision Balancing of Railway Electrical Equipment Greatly Reduces Frequency of Failure and Assures More Efficient Operation.**



Dial indicates exact number of correction units required.

## THE WAY TO BETTER CRANKSHAFTS—SUPERFINISH

### Versatile Machine Handles Variety of Sizes

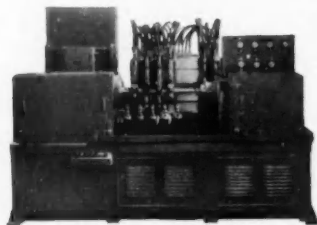
Even on diesel engine crankshafts, Superfinishing is a quick, inexpensive process.

This Superfinisher is a Model 77, arranged to do both pin and main bearings on a variety of 4 and 6 throw crankshafts. Four sets of stones in each of the upper stoneholder assemblies handle the pin bearings. Lower assemblies each have two sets of stones for the main bearings.

Crankshafts come to the Superfinisher with rough ground bearing surfaces of 20-30 micro inches. After a 2.3 minute automatic cycle, surfaces measure 4-5 micro inches. What this finer smoothness means in greater crankshaft performance is obvious—

grinding chatter marks and smear metal are removed, there's improved geometry, added smoothness and longer bearing life.

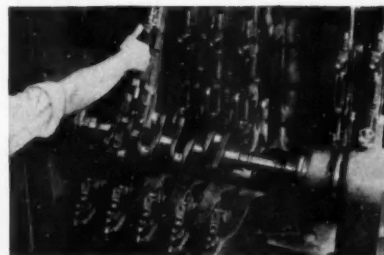
See how your own problems can be solved by Superfinishing. Write for your complimentary copy of



Model 77 Superfinisher for 4 and 6 throw crankshafts.

"Wear and Surface Finish."

**Superfinishing These Crankshaft Bearings Not Only Assures Longer Lasting Surfaces, but It Also Cuts Grinding Time and Costs.**



Close-up showing upper and lower stoneholder assemblies for Superfinishing pin and main bearing simultaneously.

No. 9-1052

399



**THE GISHOLT ROUND TABLE** represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

# GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

# SAE West Coast Meeting

(Continued from page 47)

formula states would be developed. Inasmuch as these bridge formulas are predicated to the nearest foot, a difference of 1 in. in the wheelbase can result in a gain or loss of as much as 850 lb of payload. The trailer axles should be located at the rear of the trailer body.

The controlling factor at the front end of the tractor is the front-of-bumper to centerline-of-front-axle dimension. Under the limitation of the bridge formula, this distance must be rigidly controlled if the maximum practicable wheelbase is to be obtained. We also recommend that the minimum weight requirement for tractor, semi-trailer equipment be one-third unladen weight to gross load.

If a standard gear shift pattern could be worked out, without retarding transmission improvements, it will be helpful. If the tinted glare-proof glass that is being built into automobiles for the casual driver's pleasure is safe and practical, then why not provide it for the professional driver?

It would seem advisable to change the present bumper location on our tractors and lower them to a height comparable to that of automobile bumpers. We feel that the manufacturers should also provide a bumper on the back of the trailers, as standard equipment, with width comparable to the frame or sub-frame, and extending to within 24 in. of the ground.

A crying need in our industry today is a three axle power unit having the following characteristics:

Not over 10,000 to 12,000 lb in weight, equipped ready for operation.

Having approximately 200 hp for adequate gradeability with loads up to 60,000 lb.

## Power Steering Types

By **W. F. DRIVER**  
Vickers, Inc.

**H**OW much power do we need for 'heavy duty' steering? The net output in a passenger car power steering system is about ½ hp, and with this a car with a 2400 lb

front axle load can be steered from lock to lock on dry concrete in about two sec. It should follow that a truck or bus with 9600 lb front axle load can be steered under the same conditions in about eight sec with essentially the same components. There are at present three primary types of hydraulic power steering systems.

All provide for automatic return to manual control in case of power failure.

### Integral Power Gear

An integral unit has the control valve or valves and power cylinder mounted integral with the mechanical steering gear. Valve is actuated by steering shaft movement, and power from the piston is transmitted directly to pitman shaft.

Advantages in this system are in simplified plumbing, having all lines integral except one from pump and

## This Tractor-Shovel loader



## Sure "Dishes Up The Dirt"

MINNEAPOLIS-MOLINE Industrial Wheel Tractors (shown with mounted shovel loader equipment) are built to deliver continuous full engine torque, at any of the 6 forward or 6 reverse speeds. ROCKFORD CLUTCHES help them move heavy road-building materials with ease and precision. Let ROCKFORD clutch engineers help specify the most practical power transmission controls for your machines.

**ROCKFORD CLUTCH DIVISION**  
315 Catherine Street, Rockford, Illinois, U.S.A.

# ROCKFORD CLUTCHES



ENGINEERING  
BULLETIN  
SENT ON  
REQUEST



# GET YOUR KEYS TO BETTER VALVE SEATS—FASTER



**WATERBURY TOOL DIVISION**  
VICKERS INCORPORATED DEPT.—A1-1  
**WATERBURY 20, CONNECTICUT**

this fact-packed booklet *Gratis*

## "SYNCHRONIZED VALVE SERVICING":

- \*ECCENTRIC over concentric grinding.
- \*Maximal precision in valve seating.
- \*Elimination of tappet adjustment.
- \*Production savings in time and costs.
- \*"Specialized" Eccentric Production and Servicing Equipment.



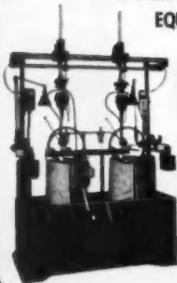
**WATERBURY-HALL SPECIALIZED ENGINEERING AND TECHNICAL SERVICE** *Gratis* **TO HELP YOU IN YOUR VALVE SEAT GRINDING PROBLEMS.**

WATERBURY'S VALVE SEAT GRINDING SPECIALISTS have enjoyed the privilege of working closely with world famous Engineering Staffs on special production and servicing problems

FORD  
CHRYSLER  
WILLYS  
LYCOMING

USAF  
U.S. NAVY  
NEW YORK CENTRAL  
CAPITOL AIRLINES

## WATERBURY-HALL "SPECIALIST" VALVE SEAT GRINDING EQUIPMENT WITH NEW FORCE-FEED HEAD



Model AVO. Dual Production Wet-Type Air-oil Lubricated Eccentric Valve Seat Grinder with NEW FORCE-FEED Head — for Radial Type Aviation and Tank Engines. Also available in a Single Spindle Unit for service or production, using the NEW FORCE-FEED Head Mechanism.

NEW force-feed head for faster grinding. Available as original equipment or for conversion.



one back to reservoir; and in relatively simple engineering required to adapt to an existing design merely by using in place of conventional gear.

Disadvantage is that road shock is transmitted directly back to the steering gear, and in some installations length of drag link requires careful engineering to preclude excessive drag link deflection. These conditions are also true in the case of any conventional mechanical gear.

This type of gear is manufactured by and is currently being used in production as follows: Saginaw Steering Gear Div., General Motors—heavy duty equipment and Cadillac, Oldsmobile and Buick passenger cars. Ross Gear and Tool Co.—heavy duty equipment. Gemmer Manufacturing Co.—Chrysler and De Soto passenger cars. Bendix Products Div., Bendix Aviation Corp.—heavy duty equipment.

### Integral Linkage Type

Using a power cylinder, integral relief and integral servo valves, the integral linkage type is connected directly to the drag link with the piston rod end anchored to the vehicle frame. The valve is actuated by pitman arm movement in response to steering wheel movement, and power is applied directly to steering linkage.

Advantages are in simplified plumbing as above, adaptability to most existing designs, although not so much so as in the integral power gear, and in the fact that all road shock is transmitted back to frame rather than to steering gear.

Disadvantage is in difficulty in adapting to certain designs such as some cab-over-engine vehicles, etc., due to space limitation.

This type of equipment is manufactured by Vickers, Inc., and is now used primarily on heavy duty equipment.

### Split Linkage Type

A power cylinder mounted at most suitable location in the steering linkage with one end of cylinder anchored to some part of the frame or axle is the basic design of the split linkage system. A separate control valve is located in the drag link and is actuated by pitman arm movement in response to steering wheel movement.

Advantages are in facts that this type of arrangement is not restrictive as to mounting and can be designed into almost any type vehicle with proper engineering, and that road shock is transmitted back to



Handle materials better,  
more cheaply,  
with equipment made of

**N-A-X**  
HIGH-TENSILE STEEL

Minimum product weight and long product service are just two important reasons why N-A-X HIGH-TENSILE steel is ideally suited for tote boxes, pallets, conveyors, lift trucks, and other equipment used for transporting materials.

Because N-A-X HIGH-TENSILE steel has exceptional strength and durability, thinner sections can be used, yet it resists abrasion, impact, fatigue, and corrosion. N-A-X HIGH-TENSILE steel gives your equipment longer life and reduces deadweight to the minimum; you can carry a greater net load of material with no increase in the gross load weight. And N-A-X HIGH-TENSILE steel has exceptional welding and fabricating qualities — important advantages where custom-made materials-handling equipment is required.

If you are interested in better, more economical materials-handling, why not investigate N-A-X HIGH-TENSILE steel now?

**GREAT LAKES STEEL CORPORATION**

N-A-X Alloy Division • Ecorse, Detroit 29, Michigan

**NATIONAL STEEL CORPORATION**



frame, or axle, rather than to steering gear.

Disadvantage is in more complicated plumbing.

This type of equipment is manufactured by and is currently being used as follows: Garrison Manufacturing Co.—heavy duty equipment. Ross Gear and Tool Co., under Garrison license—heavy duty equipment.

All three of these basic designs have been thoroughly proved in the field and, as indicated, each has its advantages and disadvantages. The most interesting future developments will probably be with the split link-

age type since its inherent flexibility offers great possibilities for new application.

## AIRBRIEFS

(Continued from page 72)

have introduced their own six-months stretch-out due to mounting costs. The new A-18 production program contains a reduction from 72.5 to 71.2 million airframe pounds for the last six months of 1952, a reduction from

170.5 to 167.6 million pounds for the whole year 1953 and a reduction from 209.3 million to 201.9 million airframe pounds for the whole year 1954. The well-known cutback in the 1955 "plateau" schedule is reduced from 79.8 to 75.9 million pounds for the first six months of that year. This stretch-out program is due to the fact that the money available will permit the services to pay only for these reduced quantities of aircraft and parts. As prices for complex electronic equipment continue to skyrocket it appears inevitable that even further reductions in deliveries will be required due to the availability of only a fixed sum of dollars contained in Congressional appropriations for the purpose. Thus, for the first time actual figures are available to support the oft-decried fact that inflation is steadily robbing our services of combat equipment.

### B-47 Know-How

Boeing Airplane Co.'s Wichita Division announces that total manhours required for production of a complete B-47 Stratojet bomber have been reduced 88 per cent since the first production airplane a year ago, a phenomenal accomplishment and still another firm argument for the necessity of continuous aircraft production. Although manhour figures are classified, some index to the ordinary fabricating complexity (as distinguished from electronic equipment) is seen in the fact that the wing assembly alone requires 15,000 close-tolerance bolt holes of which 6,000 have tolerances of 0.002 to 0.001 in. Wing skin gage goes as high as 0.625 in. thickness. The installation job is a lot more complex, too, with a matter of 27 miles of wiring to be cut to length, routed in the airplane and installed at the proper connections.

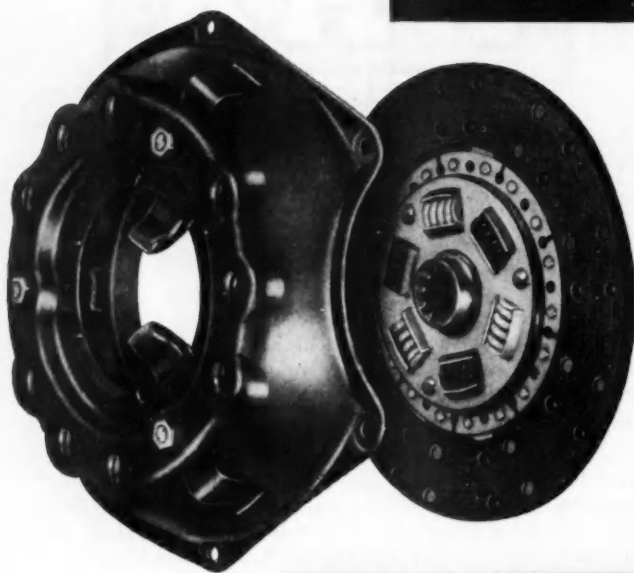
### Supersonic Passenger

The British officially announce that the de Havilland DH-110 all-weather fighter has flown faster than the speed of sound. While such announcements are now routine, what makes this one important is the fact that it is twin-engined and carries a radar operator. Thus, apparently the first passenger in an airplane has flown faster than the speed of sound. We say "apparently" because there are indications that the Northrop F-89, which is both twin-engined and carries a radar operator, has exceeded the speed of sound, and Lockheed vice-president-engineering Hall Hibbard recently stated flatly that the Lockheed F-94C

(Turn to page 94, please)

Engineered by Borg & Beck...

... means  
MAXIMUM  
PERFORMANCE  
MINIMUM  
MAINTENANCE!



You can depend on

**BORG & BECK**

CLUTCHES...FOR THAT VITAL SPOT WHERE  
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Reg. U.S. Pat. Off.

**BORG & BECK DIVISION • BORG-WARNER CORPORATION**

Chicago 38, Illinois

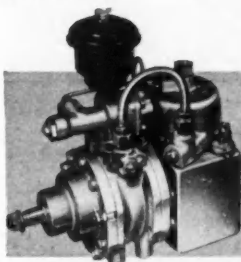
# Wagner Air Brakes

ARE  
AVAILABLE IN  
*1. Air-Over-Hydraulic*  
or  
*2. Straight Air*  
SYSTEMS

These two types of Wagner Air Brake systems offer many operating advantages. The STRAIGHT AIR system for cam type foundation brakes provides plenty of controllable power and the AIR OVER HYDRAULIC system combines many advantages that result in a material reduction in maintenance and operating costs. These Wagner systems meet the requirements of all types of vehicles and assure highest braking efficiency.

## ALL WAGNER AIR BRAKE SYSTEMS HAVE THE ROTARY AIR COMPRESSOR

In every Wagner Air Brake System you get the famous Wagner Air Compressor, known for its long life, dependability and high efficiency. It is of the *Rotary* type—thousands of small overlapping air compression impulses occur per minute assuring an abundance of air under all operating conditions. Simple in construction, easy to install and repair, the Wagner Rotary Compressor will give years of dependable service and provide real economy in Preventive Maintenance. It will pay you to investigate the many advantages of Wagner Air Brakes as standard equipment on the vehicles you manufacture. Get complete information and copy of Catalog KU-201. Coupon is for your convenience.

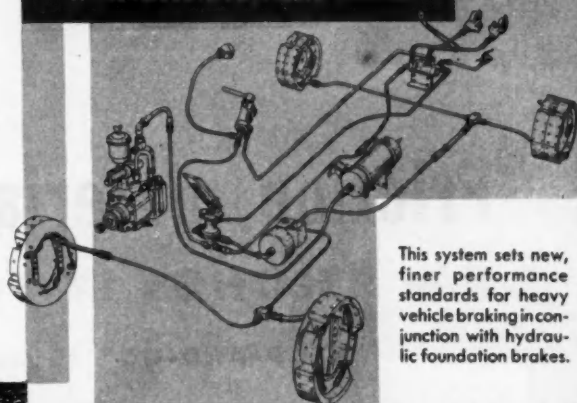


*The Most  
Reliable  
Air Compressor*

Wagner Products Serve the  
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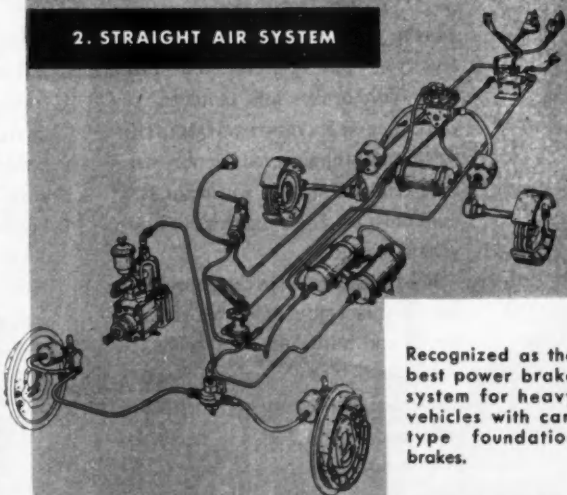
LOCKNEED HYDRAULIC BRAKE PARTS and FLUID  
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This system sets new, finer performance standards for heavy vehicle braking in conjunction with hydraulic foundation brakes.

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Recognized as the best power brake system for heavy vehicles with cam type foundation brakes.

Used as original equipment  
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**Air Brake**  
DESCRIPTIVE  
CATALOG  
**NOW!**



K52-4A

# Friction material problem?

## R/M BELONGS IN YOUR PICTURE!

**"STOP-AND-GO" IS OUR BUSINESS!**

Maybe you don't make light delivery trucks . . . but whatever your problems with brakes and clutches, you can count on RAYBESTOS-MANHATTAN for specially engineered friction materials that will do for you what R/M materials do for America's leading vehicle builders!

R/M's leadership in the automotive industry is traditional. More cars, trucks and buses use R/M brake linings, clutch facings, and automatic transmission friction parts than any other make. And R/M's leadership in these products extends to many other fields, from office machines to oil well

equipment and heavy mine machinery.

Your R/M representative can work from samples, from designs on paper, or from figures on horsepower developed, combined with desired performance characteristics. Call him in! Behind him stand the full facilities of the world's largest maker of friction materials . . . with six great plants, their research departments, and their testing laboratories.

*The opening of our new Wabash Division, Crawfordsville, Ind., provides expanded facilities for the manufacture of*  
**SINTERED METAL FRICTION MATERIALS**

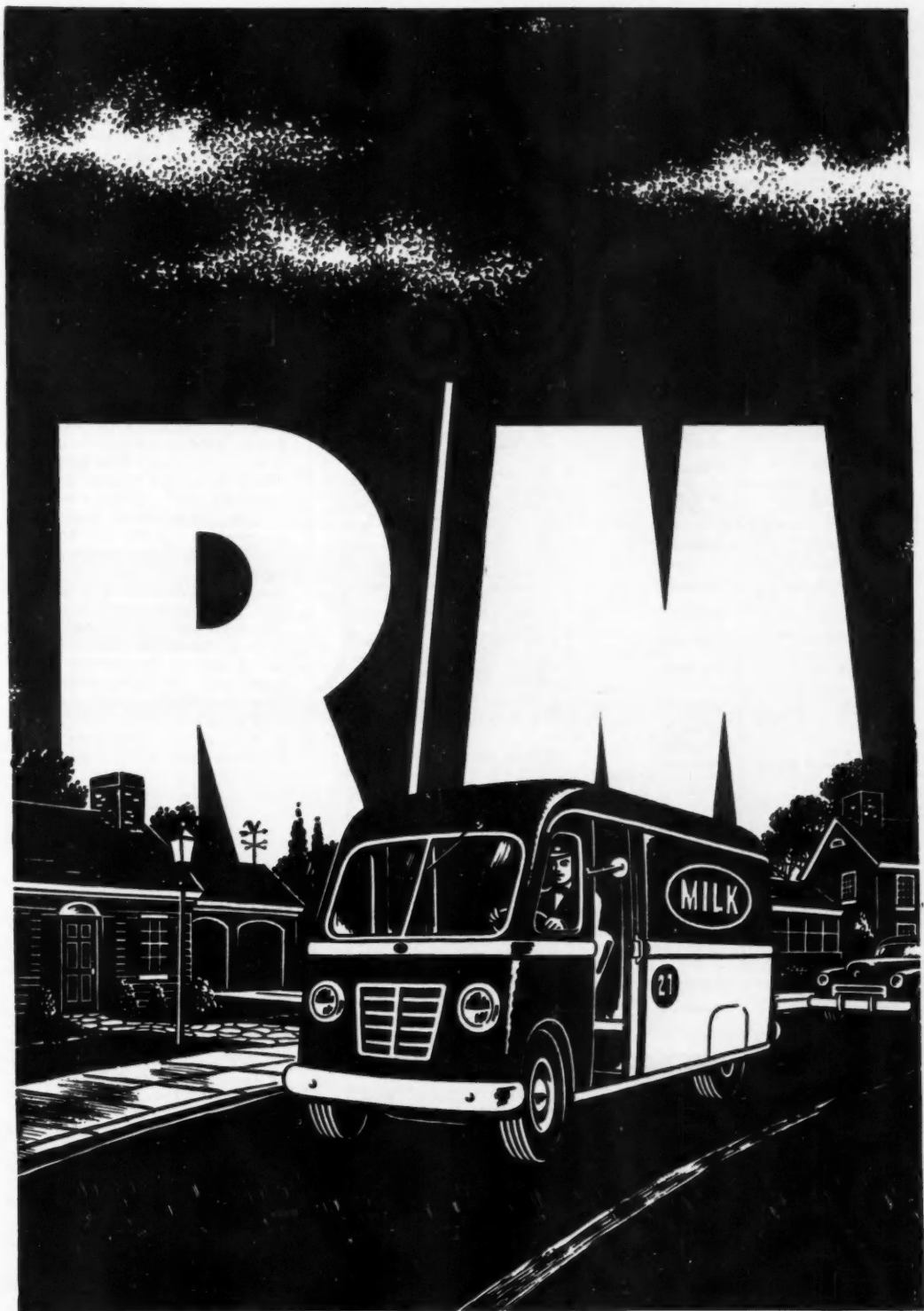


### **RAYBESTOS-MANHATTAN, INC.**

**EQUIPMENT SALES DIVISION 445 Lake Shore Drive, Chicago 11, Ill.**  
**Detroit 2                      Cleveland 14                      Los Angeles 11**


**Factories:** Bridgeport, Conn.                      Monheim, Pa.                      Passaic, N.J.                      No. Charleston, S.C.  
Crawfordsville, Ind.                      Canadian Raybestos Co. Ltd., Peterborough, Ont.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings  
Fan Belts • Radiator Hose • Industrial Rubber Products • Rubber Covered Equipment • Mechanical  
Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls





# AMERICAN CHEMICAL PAINT COMPANY

AMBLER  PENNA.

## Technical Service Data Sheet

### Subject: SPECIFICATION RUST PROOFING AND PAINT BONDING CHEMICALS

SPECIFICATION NUMBER	ACP SPECIFICATION CHEMICAL	SPECIFICATION TITLE
QQ-P-416	"LITHOFORM" "ZINODINE"	PLATING, CADMIUM (ELECTRODEPOSITED)
RR-C-82	"LITHOFORM" NO. 32	CANS, CORRUGATED; ASH AND GARBAGE, TAPER-SIDE, ZINC-COATED, WITH COVERS
MIL-C-5541 (See also QPL-5541-1)	"ALODINE"	CHEMICAL FILMS FOR ALUMINUM AND ALUMINUM ALLOYS
MIL-C-16232 Type I Type II	"THERMOIL-GRANODINE" "PERMADINE"	COATINGS — PHOSPHATE, OILED, SLUSHED, OR WAXED (FOR FERROUS METAL SURFACES) AND PHOSPHATE TREATING COMPOUNDS
MIL-E-917A (Ships)	"GRANODINE" "LITHOFORM" "ZINODINE"	EQUIPMENT, ELECTRIC POWER, BASIC REQUIREMENTS FOR (NAVAL SHIPBOARD USE)
MIL-L-3077	"PERMADINE"	LINKS, METALLIC BELT, FOR SMALL ARMS AMMUNITION
MIL-S-5002	"ALODINE" "GRANODINE"	SURFACE TREATMENTS (EXCEPT PRIMING AND PAINTING) FOR METAL AND METAL PARTS IN AIRCRAFT
MIL-V-3329	"GRANODINE"	VEHICLES, COMBAT, SELF-PROPELLED AND TOWED; GENERAL REQUIREMENTS FOR
JAN-C-490, Grade I	"GRANODINE"	CLEANING AND PREPARATION OF FERROUS METAL SURFACES FOR ORGANIC PROTECTIVE COATINGS
JAN-F-495	"GRANODINE" "LITHOFORM"	FINISHES FOR EQUIPMENT HARDWARE
JAN-L-548A	"PERMADINE"	LINK, METALLIC BELT, 20 MM., M8
JAN-T-704	"GRANODINE"	TREATMENT AND PAINTING FOR CONSTRUCTION AND ENGINEERING EQUIPMENT
AN-E-19	"ZINODINE"	ELECTRONIC EQUIPMENT; GENERAL SPECIFICATION FOR
AN-F-20 (See also U.S.A. 3-213)	"ALODINE" "GRANODINE" "LITHOFORM" "PERMADINE" "THERMOIL-GRANODINE" "ZINODINE"	FINISHES, FOR ELECTRONIC EQUIPMENT
U.S.A. 57-0-2C Type II, Class A Type II, Class B Type II, Class C	"THERMOIL-GRANODINE" "PERMADINE" "GRANODINE"	FINISHES, PROTECTIVE, FOR IRON AND STEEL PARTS
U.S.A. 51-70-1 Finish 22.02, Class A Finish 22.02, Class B Finish 22.02, Class C	"THERMOIL-GRANODINE" "PERMADINE" "GRANODINE"	PAINTING AND FINISHING OF FIRE CONTROL INSTRUMENTS; GENERAL SPECIFICATION FOR
U.S.A. 50-60-1	"GRANODINE"	CONTAINERS, METAL, FOR ARTILLERY AND ROCKET AMMUNITION
U.S. Naval O. S. 675	"ALODINE"	SPECIFICATIONS FOR THE MANUFACTURE AND INSPECTION OF CARTRIDGE, POWDER, AND ROCKET TANKS (ALUMINUM)
U. S. N. Appendix 6	"LITHOFORM"	INSTRUCTIONS FOR PAINTING GENERAL SPECIFICATIONS FOR BUILDING VESSELS OF THE UNITED STATES NAVY
M-364	"PERMADINE" "THERMOIL-GRANODINE"	NAVY AERONAUTICAL PROCESS SPECIFICATION FOR COMPOUND PHOSPHATE RUST-PROOFING PROCESS
16E4 (Ships)	"ALODINE" "GRANODINE" "ZINODINE"	ELECTRONIC EQUIPMENT, NAVAL SHIP AND SHORE; GENERAL SPECIFICATION
AN-C-170	(See MIL-C-5541)	CHEMICAL FILMS FOR ALUMINUM AND ALUMINUM ALLOYS
U. S. A. 72-53	(See AN-F-20)	FINISHES (FOR GROUND SIGNAL EQUIPMENT)
AXS-1245	(See JAN-C-490)	CLEANING AND PREPARATION OF FERROUS METAL SURFACES FOR ORGANIC PROTECTIVE COATINGS (EXCEPT FIXED INSTALLATIONS)



WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS



## AIRBRIEFS

(Continued from page 90)

Starfire, which carries a radar operator, had exceeded the speed of sound. But the British are the first with an official announcement of a supersonic passenger and so the history book must record another widening of the breach through the sonic wall, a term now found only in old magazines.

### Factory Depots

An Air Force general officer announced the other day that air delivery of spare parts, which permits rushing a part anywhere in the world within 48 hours, may eventually make huge USAF spare parts depots unnecessary, specifically overseas warehouses. What he neglected to mention is that this theory does nothing to reduce the number of spare parts required and merely serves to make the airframe manufacturer go into the warehousing business on a huge scale. Stocking spares in the manufacturers plant is about as unpopular an idea to the manufacturer as the military could propose. "Spare" is synonymous with "headache" to the Airframe manufacturer, who actually has as high as 90 per cent of his spares built by subcontractors, to whom warehousing would be even more unpopular. If the industry has its way, general, Air Force depots will become larger—not smaller.

### News of the

## MACHINERY INDUSTRIES

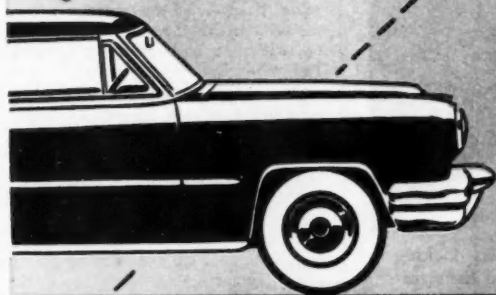
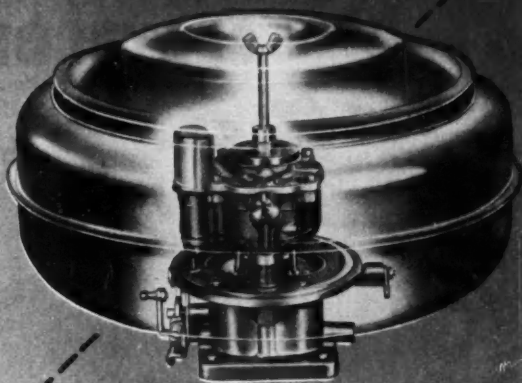
(Continued from page 55)

saver electrically-operated hand lift trucks, and T. F. Moriarity as sales manager for manually-operated hand lift trucks.

Firth-Sterling, Inc., Pittsburgh tool steel manufacturer, has acquired 25,000 square feet of plant space from Linde Air Products Co. About 7000 square feet of the area will be used to produce ammonium paratungstate, which is used in fabricating tungsten carbide for cutting tools, dies, and armor-piercing projectiles.

The company also is preparing to manufacture and process titanium carbide which has wide application in gas turbines.

*Lower  
Hood Lines  
— Better  
Performance*



for 1952  
Luxury Cars

with The New HOLLEY

**CENTRI-FLO**

Carburetor

Hood lines are lower—visibility for the driver greater in many of 1952's fine cars than in any previous models. One important reason: the Holley Centri-Flo carburetor.

The Centri-Flo is the first commercially accepted carburetor ever built with the high capacity air cleaner mounted over and around it so as to hide the main body. This carburetor-air cleaner combination provides minimum overall height and allowed automotive designers to lower hood lines—increase visibility for the driver.

The Centri-Flo is a true concentric carburetor. The fuel level over the centrally located jets is the same regardless of angularity. Centri-Flo equipped passenger cars and trucks start instantly on the steepest grades—won't miss or stall during fast stops and starts.

The Centri-Flo is a Holley model 1901. It is a dual-downdraft carburetor designed for engines of 110-180 H. P.

FOR MORE THAN HALF A CENTURY —  
ORIGINAL EQUIPMENT MANUFACTURERS  
FOR THE AUTOMOTIVE INDUSTRY

**HOLLEY**  
*Carburetor Co.*

Detroit 4, Michigan

of course...

## CROWN RHEOSTAT USES **PLATECOILS**

(REPLACE PIPE COILS)



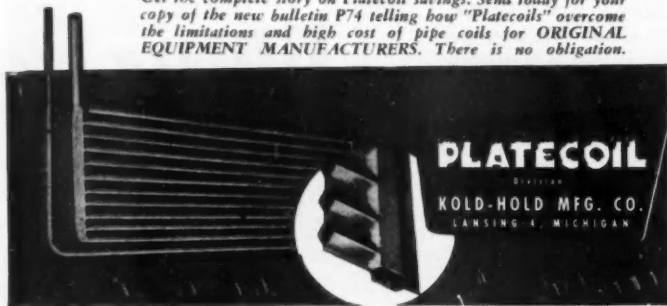
### HERE'S WHY

Original equipment manufacturers looking for ways to add sales advantages to their machines without adding to their cost have been quick to standardize on Platecoils. The Crown Rheostat and Supply Co., Chicago, Illinois, has joined the rapidly growing list of Platecoil users with the following results: "The quality workmanship of Crown equipment calls for the installation of only the *best accessories* and Platecoil easily enters into this group of items *acceptable to a discriminating plating trade.*"

"Platecoils are advantageous because of their space-saving qualities and high efficiency plus the fact they are so easily cleaned and maintained. Crown Rheostat and Supply Co. finds it advantageous to use Platecoils in partially automatic and fully automatic plating machines, barrel plating and still tank equipment."

You, too, will find that Platecoils provide better heat transfer for only a fraction of the cost of pipe coils. Engineering and estimating take less time. Installation is simplified and less costly.

*Get the complete story on Platecoil savings. Send today for your copy of the new bulletin P74 telling how "Platecoils" overcome the limitations and high cost of pipe coils for ORIGINAL EQUIPMENT MANUFACTURERS. There is no obligation.*



## New Aluminum Plant

(Continued from page 37)

the water coils are 72 in. by 180 in. Water coil manifolds connect the two water coils in series for water flow.

Each unit also has one single-pass oil cooling coil that utilizes  $\frac{3}{4}$  in. OD by 0.035 in. tubes, aluminum fins, and Young turbulating-type agitators inside the tubes. The finned face dimensions of the oil coils are 66 in. by 180 in.

Thermostats control electrically-operated shutters, which are interlocked with the fan motor starter. The shutters over the oil coils and those over the water coils are controlled separately from individual thermostats. Position of the shutters determines whether the fan motor is off, operating at half-speed, or running full speed.

The GM engines use Young VAD-type (vertical air discharge) units. Each cooling unit has four vertically-mounted water cooling coils and two vertically-mounted oil cooling coils. The single pass water coolers use aluminum cores. Core face dimensions are 48 in. by 150 in. Water coil manifolds connect the coils in series for water flow.

Single pass low pressure drop oil cooling coils are of  $\frac{3}{4}$  in. by 0.049 in. tubes. Fins and turbulating-type agitators are aluminum. Finned face dimensions are 69 in. by 150 in.

Tripod and fan assemblies are based on independent foundations clear of the main frame and coil structure so that vibration is not transmitted from moving parts to the coils.

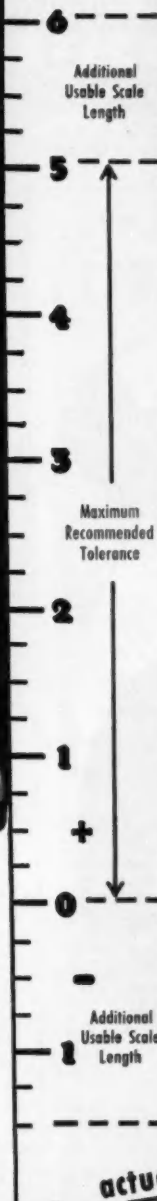
### New Test Station for Aircraft Atom Reactor

Construction will begin this summer on a \$33 million facility in eastern Idaho, where the Atomic Energy Commission will test a prototype aircraft propulsion reactor.

Aircraft Gas Turbine Dept. of General Electric Co. is handling design, development, and preliminary fabrication of the engine at Lockland, Ohio. Parsons-Macco-Kiewit Co. of Los Angeles, under a G-E subcontract, has made preliminary design studies for the new facility at the AEC National Reactor Testing Station in Idaho. Following completion of basic fabrication in Ohio, the atomic power plant will be assembled at the Idaho site.



PRECISIONAIRE  
10,000 AMP.  
SCALE  
.000025  
INTERNAL



The  
**SHEFFIELD**  
CORPORATION  
DAYTON 1, OHIO, U.S.A.

# SHEFFIELD COLUMN PRECISIONAIRE

**7½ inches of usable scale length—more than twice as much as most other air gages.**

**MANY MORE CLASSIFICATIONS**—more selections can be made because of the extra scale length—manufacturing tolerances can be widened to save time and cost without sacrificing quality.

**7½" SHOWS HOW MUCH PARTS ARE OUT**—especially advantageous where parts are coming consistently on the borderline or just outside tolerance limits.

**BETTER FOR BRINGING TO SIZE**—Readings can be taken earlier when approaching size so that the operator is sure of not going beyond tolerance, in fact, he can accurately work to desired limits *within* the tolerance zone.

**CLOSER MACHINE CONTROL**—with greater scale length the trend of the machine and tooling to go out of control shows up sooner, reducing possibility of rejects.

**MORE ACCURATE QUALITY CONTROL CHARTS**—the column Precisionaire scale is a running quality control chart in itself. Readings can be transferred to a chart with greatest accuracy.

**OPERATORS LIKE THE LONG SCALE**—with higher amplifications the spread for the tolerance and each classification is wider, making the operator's job easier.

PHONE, WIRE, OR WRITE CUSTOMER CONSULTATION FOR DEMONSTRATION IN YOUR PLANT. CATALOGS CAN BE SENT AT ONCE.

the *Sheffield* corporation  
DAYTON 1, OHIO, U.S.A.

MODEL NUMBER	MAXIMUM RECOMMENDED TOLERANCE	MINIMUM USABLE SCALE LENGTH BEYOND TOLERANCE LIMITS
1,000	.005	.0025
2,000	.0025	.0013
5,000	.001	.0005
10,000	.0005	.00025
20,000	.00025	.000125





## Fuller New Torque Converter

(Continued from page 54)

into the impeller in the direction of original flow. In the converter range, the reaction member is locked to the housing through the overrunning clutch. Thus, the thrust reaction from changing the oil direction by the reaction member vanes is taken by the housing. This thrust load imparted to the oil stream creates the torque multiplication in the unit.

As the torque requirement on the runner shaft is reduced, the runner speed will increase to the point where the oil, emerging at the inner edges of the vanes, will strike the reaction member vanes on the reverse side. The overrunning clutch on which the reaction member is mounted will then permit it to start rotating with the runner. This action changes the unit

into a straight hydraulic coupling which does not multiply the engine torque.

Since the oil pressure is slightly higher in the reaction member vanes where its direction is changed than it is at the entrance to the impeller vanes, by-pass circulation to the oil reservoir is created through the small oil passages. Cooling of the oil is accomplished by radiation from the walls of the converter and reservoir. This self-contained radiation system has sufficient capacity to cool the converter under normal operating conditions. However, openings are provided for connecting a radiator or heat exchanger, if additional cooling is required. When a radiator or heat exchanger is used an internal oil passage must be partially plugged. The maximum operating temperature should not run over 250 F.

The new converter is designed to handle engines developing from 180 to 225 lb ft of torque. In order to permit operation in the coupling range part of the time to assist cooling, use with engines having a top speed of 2000 to 2200 rpm or higher is recommended by the manufacturer.

Maximum torque multiplication of the converter is approximately 2 to 1. However, this ratio is obtained only when the output shaft is not turning. This is an excellent characteristic for loaders, plows, winches, etc., where the maximum torque is required for short intervals at low shaft speeds. On the other hand, when a torque converter is used for propelling a machine or vehicle, account must be taken of the reduced rpm of the output shaft in conversion range.

Two types of output shafts are available. In model 12-S, a 1½ in. 10-spline shaft is provided for straight line drives with a universal joint. If it is desirable to use sprockets, pulleys, or gears on this model, they should be independently supported in outboard bearings. The model 12-A has a flanged output shaft and an SAE No. 3 flywheel housing at the rear. This design permits the installation of a second flywheel, automotive clutch and mechanical transmission.

## HARDENED & GROUND PARTS to exact specification

**T**his spring pivot bolt typifies our machining versatility and strict adherence to specifications. Bolt is made from 1½" high-carbon alloy steel hex bar stock; overall length, 5½". Threads are precision cut, concentric with body diameter. After heat treating, threads are re-threaded to the specified pitch diameter. Bearing surface is ground to a fine micro-finish, ±.001 tolerance. The very latest equipment is used to make the knurling clean and sharp.

Brown Hardened and Ground Parts have served the automotive industry for over 40 years. Our specialty is precision machining, scientifically-controlled heat treating and micro-finish grinding. How can we serve you? Write or wire . . .

*Henry W. Brown*  
PRESIDENT

Experienced production on  
King Pins  
Shackle Bolts  
Shackle Pins  
Brake Anchor Bolts  
Countershafts  
Idler Shafts  
Stub Axle Shafts  
Steering Ball Bolts  
Beam Bolts and Bolts  
5th Wheel Rocker Shafts  
Wheel Studs  
Water Pump Shafts  
anything in the hardened and ground line of any analysis steel, up to 4"

# THE BROWN CORP.

213 BELLEVUE AVE.

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C. H. Ebert, 2407 Cleveland Rd., Cleveland • H. F. Spring, 4716 Balboa Rd., Detroit • R. C. Sanderson, 880 N. Clark St., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • James William & Co., 1400 N. Spring St., Los Angeles, Calif. • John B. Hunt, 1011 S.E. Yamhill St., Portland, Ore.

## AUTOMOTIVE INDUSTRIES . . .

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Automotive and Aviation

## MANUFACTURING



# ***KELSEY-HAYES***

Leading Producer of Wheels for Every Purpose, Offers . . .

**STYLE-PERFECTED WIRE WHEELS!**



*for Tomorrow's Cars of Greater Distinction:*

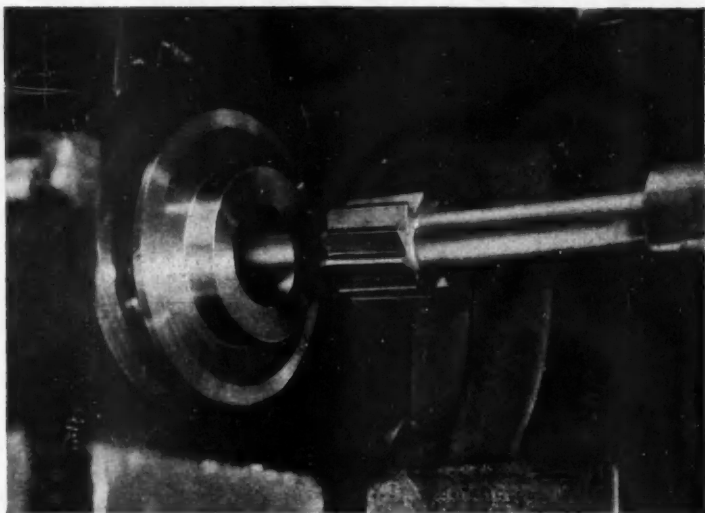
Skillfully designed! Radically improved over former American types, or even present-day importations! A major achievement to greatly enhance a modern car's entire appearance of custom styling, for those to whom pride of ownership is all important! Wheels of superior strength, safety and brake-cooling action, as well as for arresting distinction!



... ASSURES PROVEN PRODUCTS AT ...  
**KELSEY-HAYES WHEEL COMPANY**  
DETROIT 32, MICHIGAN



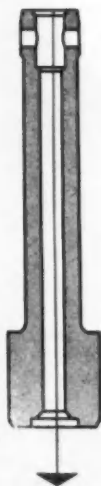
PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Whorls, Hubs, Axles, Parts for Farm Implements  
PLANTS: Kelsey-Hayes Plants in Michigan (4), McKeesport, Pa., Los Angeles, Calif., Davenport, Iowa, Windsor, Ontario, Canada



## **REAM FINE FINISHES ON SCREW MACHINES AND TURRET LATHES**

### **20-25 micro-inch finish**

Reamed finishes which were never considered possible are now obtained on production jobs with Barber-Colman Oil-Feed Reamers. On this job, 1000 pieces were reamed to a surface finish of 20-25 micro-inches before it was necessary to sharpen the reamer. The feed is 1.75" per minute at 280 RPM, requiring 30 seconds to ream the 7/8" length of cut. The material is AISI C 1137 steel. Finishes like this can be obtained in regular production with Barber-Colman Oil Feed Reamers.



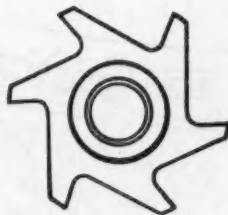
### **oil feed**

An outstanding feature of these oil-feed reamers is that the oil feeds through the body of the reamer to flush the chips away from the cutting area. Other types of reamers tend to pack the chips in front of the reamer, increasing the chance for "pick up" which often ruins the finish and shortens the life of the tool. As the oil hits the end of the hole, it is forced back between the flutes, carrying the chips with it. Another aid to extending tool life is that the oil reaches the cutting area on jobs which could not otherwise effectively employ a free flow of coolant.

**D E S I G N E R S   O F   S T A N D A R D   A N D   S P E C I A L**

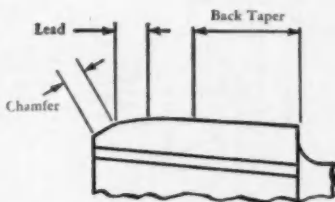
### Irregularly-spaced flutes

Irregular spacing is a standard feature of all Barber-Colman Oil-Feed Reamers. This type of spacing provides a smooth cutting action and fine finish and prevents the reamer from forming "welts". Thus, the design of the spacing in conjunction with the oil-feed feature allows these reamers to produce surface finishes which formerly required a secondary finishing operation. To aid in checking the reamer diameter, the flutes are spaced diametrically opposite each other so that they can be inspected with a micrometer.



### cam-controlled sharpening

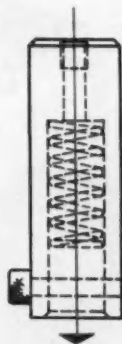
The profile form on the reamer flutes is important in obtaining the best finish and tool life. Following a 30° chamfer, the lead is blended into a radius and followed by a straight portion which irons out the feed marks. This combination produces exceptionally fine finishes. Also, through the use of the Barber-Colman system of sharpening, a theoretically sharp cutting edge is produced rather than a cylindrical land. The Barber-Colman system is cam-controlled so that each reamer is sharpened with exactly the same profile. These are features which are available in no other type of reamer.



### self-centering floats

These spring-type floats hold the reamer firmly, eliminating any sagging. Its simple design, consisting of only the holder, drive pin and spring, makes it easy to operate and maintain. An opening through the center of the float allows the oil to reach the reamer. Only two floats are required to cover the complete range of sizes, although a float of extra length is available for the larger sizes. These reamers are available for diameters of .344" through 1.380".

Ask for new bulletin listing specifications and prices or call your nearest Barber-Colman representative.



HOBS • CUTTERS • REAMERS  
HOBBING MACHINES  
HOB SHARPENING MACHINES



**Barber-Colman Company**

GENERAL OFFICES AND PLANT, 100 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

M E T A L   C U T T I N G   T O O L S   S I N C E   1 9 0 8

*extra  
output*



**SIMONDS**  
ABRASIVE CO.  
**Grinding Wheels**



Simonds Abrasive Company grinding wheels make good news... a continued story in top economy, quality output and lasting performance.

Behind this newsmaking efficiency is complete, exacting quality control from crude abrasive to finished wheels... plus accurate specifications that assure you of wheels that conform to your job needs.

Free data book gives information on our complete line, including grinding wheels, mounted wheels and points, segments and abrasive grain.

Let's send your copy, together with name of your Simonds distributor. Write.

SIMONDS ABRASIVE CO. PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON  
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

## New Products

For additional information please use  
postage-free reply card on page 65

(Continued from page 64)

### Hydraulic Hand Pump

A hydraulic hand pump, which is said to meet aircraft, ordnance, and numerous civilian specifications, has been placed on the market. Prime features are an all aluminum body, stainless steel piston and working parts and a double check feature which holds pressure at any position of handle.

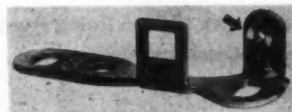


The pump is equipped with either stem, socket or extension-type operating handle—pre-set on adjustable by-pass or pressure relief valve. It is available in two standard sizes: 1500 psi having 1.5 cu in. stroke displacement, 3000 psi having .75 cu in. displacement, or to the buyer's specifications. *Alten Foundry and Machine Works.*

Circle P-7 on page 65 for more data

### Tungsten Contact Disk

A ventilated tungsten contact disk for Holley ignition distributors is said to minimize destructive arc action which otherwise would result in trans-



fer and pitting between the breaker points. Furthermore, the ventilated contacts are reported to provide better engine performance. *Fansteel Metallurgical Corp.*

Circle P-8 on page 65 for more data

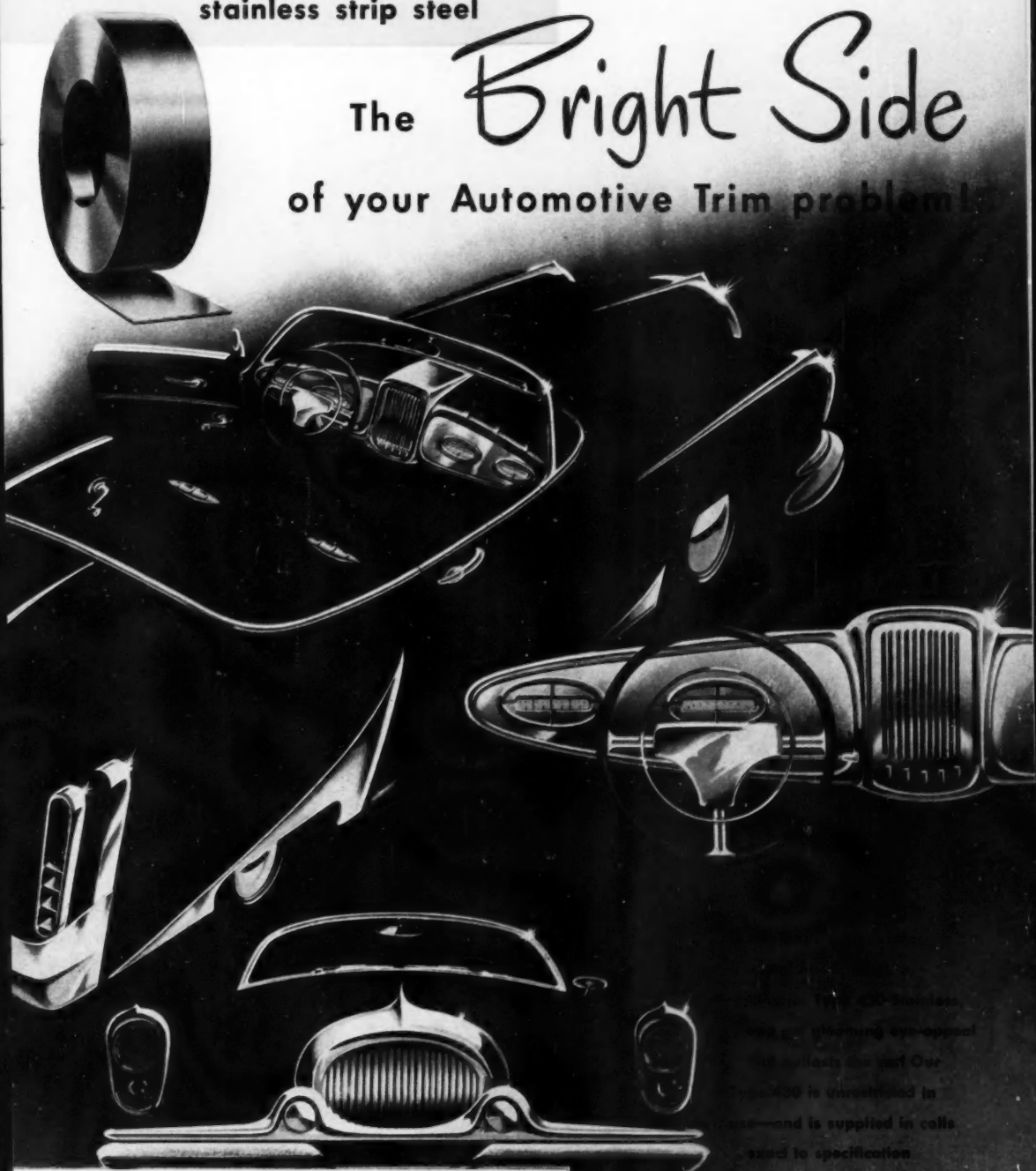
### Military Meters

Meters designed to meet military specification MIL-M-10304 are now being produced. These "Ruggedized" (Turn to page 105, please)

# **Superior** TYPE 430

stainless strip steel

The *Bright Side*  
of your Automotive Trim problem!



## **Superior Steel**

CORPORATION

CARNEGIE, PENNSYLVANIA

Superior Type 430 Stainless  
steel has a gleaming eye-appeal  
that reflects the best. Our  
Type 430 is manufactured in  
the U.S.—and is supplied in coils  
and to specification  
in temper and finish.  
Get a quote on your needs!

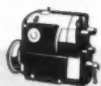




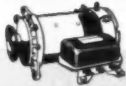
## Objective: TOMORROW'S HORIZON!

Skillful planning and forward thinking today underwrite the needs of a swiftly changing world tomorrow. American Bosch is firmly committed to this modern industrial concept in research, field engineering and the most modern production facilities. It results in superior American Bosch Products . . . Products that are known the world over for premium performance and dependable service. This is the significant reason so many American Bosch Products are in ever-widening use as preferred equipment by the aircraft, diesel and automotive industries. American Bosch Corporation, Springfield 7, Mass.

# AMERICAN BOSCH



Automotive and  
Aviation Magnets



Generators and  
Regulators



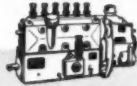
Components for  
Aircraft Engines



All Electric  
Windshield Wipers



Ignition  
Coils



Diesel Fuel  
Injection Equipment

## New Products

For additional information please use postage-free reply card on page 65

(Continued from page 102)

meters are specified on Government contracts for many Army, Navy and Air Force electrical and electronic instruments. They are built to withstand rough usage, shock and extremes of temperature, pressure, etc.

The meters are available as d-c voltmeters, ammeters, milliammeters, and micro-ammeters and also may be ordered as rectifier type a-c instruments. *Sun Electric Corp.*

Circle P-9 on page 65 for more data

### Door Locks for Utility and Tank Bodies

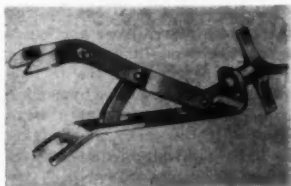
Eight recessed door locks have been added to a line of slam action locks for utility and tank bodies.



Locks are available with end-latching slide bolts or side-latching slide bolts, in two or three point locking arrangements, and in key-locking or non key-locking models. Operation is easily accomplished by actuating hinged paddle. *Eberhard Manufacturing Co.*

Circle P-10 on page 65 for more data

### Valve Lifter and Spring Compressor



A screw type lifter with the lower jaw and frame in one solid piece of hardened steel, is now on the market. It features high lift, abundant room for inserting and removing valve key, adjustable upper jaw and the compression of valve springs. (*Zink Mfg. Co.*)

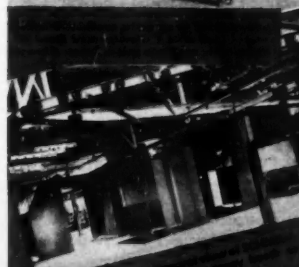
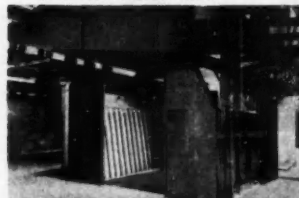
Circle P-11 on page 65 for more data



These photographs of SCHMIEG finishing equipment recently installed in the ultra-modern plant of a large manufacturer of kitchen equipment and other metal specialty items.



Above is SCHMIEG air supply equipment located in the building penthouse. During operation, doors in equipment enclosure are closed. Stock and fan is one of five stocks from spray booths on the floor below.



THE *best* AIR PURGE CENTRI-MERGE

**Schmiege INDUSTRIES INC.**  
Engineers & Manufacturers

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# FINISHING SYSTEMS

## ask the Engineers...

Why SCHMIEG Finishing Systems give best performance per dollar invested.

It's no secret that design experience and engineering skill have put SCHMIEG out in front, where careful planning and reasons of economy are most necessary for specific plant installations.

SCHMIEG Uni-Flow SPRAY BOOTHS offer important advantages in space saving and operating economy.

SCHMIEG Industrial OVENS are recommended by engineers who know, for hundreds of uses that save dollars in plant operations.

So also the SCHMIEG mesh-belt, conveyor type WASHERS, and the automatic circular types which time, index and rotate parts through wash, rinse and blow-off steps—operated by a single worker.

For the very best aids to efficient, money-saving industrial operations, ask the engineers who know—about SCHMIEG. Then call in our engineers to design units ideally suited to your specific needs.

SCHMIEG Centri-Merge dust and fume elimination units have been acclaimed as the best solution to the problem of removing dust and fumes, in any industrial application.

\*Write for folder giving partial list of users.

# The BUSINESS PULSE

(Continued from page 70)

sions are going on between the union and the operators, but there has been no indication of the probable outcome.

Heavy steel-using industries, such as automotive and rail-equipment manufacture, whose output has already been curtailed by the supply pinch, are disturbed by the many imponderables in the situation. Spokesmen for the automobile industry, for example, have said that present steel

allotments cover only 73 per cent of authorized fourth-quarter production and warn that a sharp curtailment of output will be necessary in December unless manufacturers get more steel.

## Influence of Steel Strike

Incoming data reflect the influence of the steel strike. According to the Bureau of Labor Statistics the num-

ber of workers employed in nonagricultural establishments declined by 400,000 between mid-June and mid-July. Actually the numbers of workers idled directly or indirectly by the dispute was 900,000, but this loss was partially offset by seasonal gains in construction, food processing and other industries. Supplementary reports indicate that the number of layoffs grew still larger after the middle of July and became most pronounced just before settlement of the dispute.

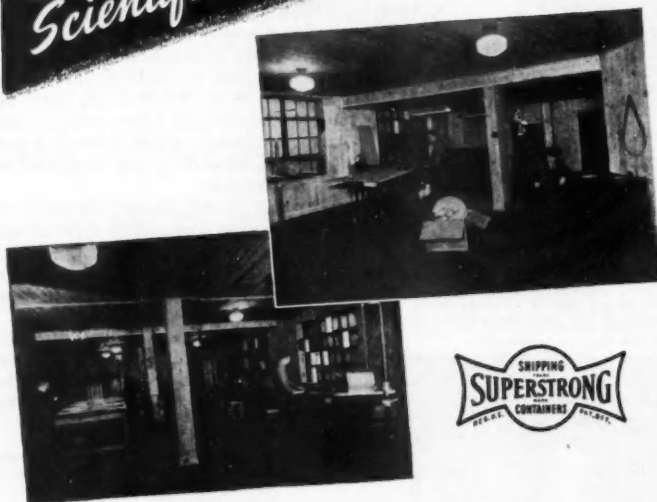
On the output side, the Federal Reserve Board's index of industrial production fell to 191 per cent of the 1935-39 average during July, as compared with 204 in the preceding month and a high of 222 in February. Preliminary estimates indicate that the August figure will show a recovery to about 212 per cent of the base-period average.

By way of contrast, retail levels have recently been fairly well maintained, despite the very high temperatures which have been experienced throughout most of the country. Total retail sales during July were off moderately from June levels, on a seasonally adjusted basis, but were about six per cent higher than in July, 1951. Department store sales followed an upward course in the early weeks of August, running some two per cent above those in the same period of the preceding year. Expenditures for new construction in July of \$3.1 billion established a new monthly record, about seven per cent higher than a year earlier. Freight carloadings, which dropped off sharply during the steel strike, have risen appreciably in recent weeks, influenced to a large extent by increased shipments of iron ore and steel.

## Price Index Up

The relative stability in general prices which prevailed earlier this year has given way to moderately inflationary tendencies. The consumer's price index, which has been inching forward since March, rose another .6 of a point between June 15 and July 15 to 190.8 per cent of the 1935-39 average, a new record. One immediate effect of this rise is to give a wage increase of three cents per hour to more than a million automotive workers covered by escalator clauses. After declining for nine successive months—and for fifteen out of the last seventeen—the wholesale price index compiled by the Guaranty Trust Co., which reflects price movements in basic commodities, rose moderately in the 31 days ended August 15. Similarly, the wholesale price index of the Bureau of Labor Statistics has moved

**CONTAINERS**  
*Scientifically Designed*



All of our boxes and crates are specially designed for YOUR product—in order to give it maximum protection with economy of weight and space. There is no attempt to fit your product into "standard" sizes of shipping containers.

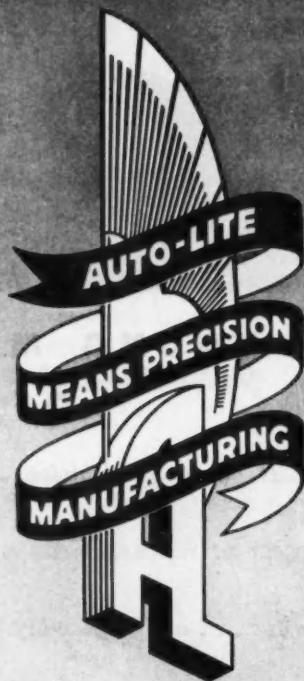
The SUPERSTRONG laboratory—certified by the National Safe Transit Committee—is for both design and testing. Here a competent staff of shipping engineers works with the most modern equipment in order that SUPERSTRONG containers may be properly developed and designed.

We shall be happy at any time to discuss your shipping needs, and to place our facilities at your disposal. There is no cost or obligation for this service.

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always  
right  
with



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**A**UTO-LITE works to serve the nation's needs in peace and in defense. In 28 great Auto-Lite plants from coast to coast, Auto-Lite produces more than 400 products which are original equipment on many makes of America's finest cars, trucks,

tractors, airplanes and boats. Their 40-year record of dependable performance is summed up in the phrase, "You're Always Right With Auto-Lite."

THE ELECTRIC AUTO-LITE COMPANY  
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Spark Plugs • Fuel Pumps • Batteries • Bumpers • Generators • Speedometers  
Horns • Switches • Moulded Plastics • Speedometer Cable  
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## YOUNG MEN OF VISION

*Their future is based on decisions made today. The secret of success at Indiana Gear is to visualize . . . create . . . prove . . . and then move on to conquer the next problem. Indiana Gear proves from past success in a highly competitive business that its policy of using master craftsmen, fine equipment, skilled subcontractors, and "young men of vision," exemplifies the perfectly coordinated planning so necessary to solve the gear problems of today.*



The driven gear shown here is 5" in pitch diameter and 15" long overall. It is carburized and hardened with heat-treating distortion held within .001".

# INDIANA GEAR



INDIANA GEAR WORKS • INDIANAPOLIS 7, INDIANA

persistently upward in recent weeks.

Open disagreement has developed among Government officials as to the probable impact of the recent increases in ceilings granted to steel companies. According to retiring Price Administrator Ellis Arnall, the increase of \$5.20 a ton in the steel ceiling will ultimately add \$100 to the budget of the average American family. Mr. Arnall has suggested to the President that it may be necessary to call a special session of Congress before the election to strengthen the price-control provisions of the Defense Production Act. Over against this, however, Economic Stabilizer Roger L. Putnam has discounted the likelihood of an inflationary spiral, while Charles Sawyer, Secretary of Commerce, emphasizing the buyer resistance now apparent in many markets, has said pointedly that "it is clear that alarmist statements or actions are not warranted and not helpful." At this writing the Office of Price Stabilization is preparing an order which will permit manufacturers using steel, aluminum and copper to pass along recent increases in the prices of these metals. In view of the spotty market situation, however, there would appear to be a practical limit to increases in actual market prices.

## BOOKS . . .

A THEORY OF PRICE CONTROL, by J. K. Galbraith, published by Harvard University Press, Cambridge 38, Mass. Everybody talks about price control, but not so many of us know what to expect of it or when and how it should be used. The author has set himself the task of supplying the underlying economic ideas which will enable the reader to decide what is or is not good price control and how particular controls affect the general operation of the economy. The book begins by showing how the competitive structure of modern industrial markets allowed price controls during World War II to work considerably better than prewar economic theory would have suggested. A fully mobilized economy, setting up standards for the administration of price controls and applying these standards to various classes of goods, is analyzed. Particular attention is paid to the role of an excess of demand for goods in a mobilized economy—the limits within which it performs a useful economic function, and when it becomes pernicious. In the last chapters the book takes up the role of price control under limited mobilization, where its operation is rather narrowly confined to preventing a wage-price spiral, as compared with full mobilization, when it is part of a comprehensive system for maximizing the use of economic resources.



# When Auto Radios Present a Tough Problem

"Here's the hitch! We've got to come up with a radio that will fit in this small space. It'll be an odd shape, too."

"Let's talk to Bendix. They've solved more and tougher problems than anybody in the radio business."



## TALK TO **Bendix** MOST TRUSTED NAME IN **Radio**

When your radio requirements call for unusual shapes or sizes, do what others have done. Call in **Bendix® Radio**. Bendix engineers have solved so many radio and electronic problems that it's virtually impossible to startle them with any request—no matter how impossible it may seem.

And, of course, you can always be certain of getting quality products when you deal with Bendix. Their auto radios have been performance-proven on the cars of one of America's largest manufacturers.

If your problem is price or production, Bendix can be of real assistance. They have long been recognized as leading automotive suppliers who understand production line costs and methods.

It boils down to this: if your problem is design . . . or quality . . . or price and production . . . or even if you have no particular problem, it will pay you to talk to Bendix.

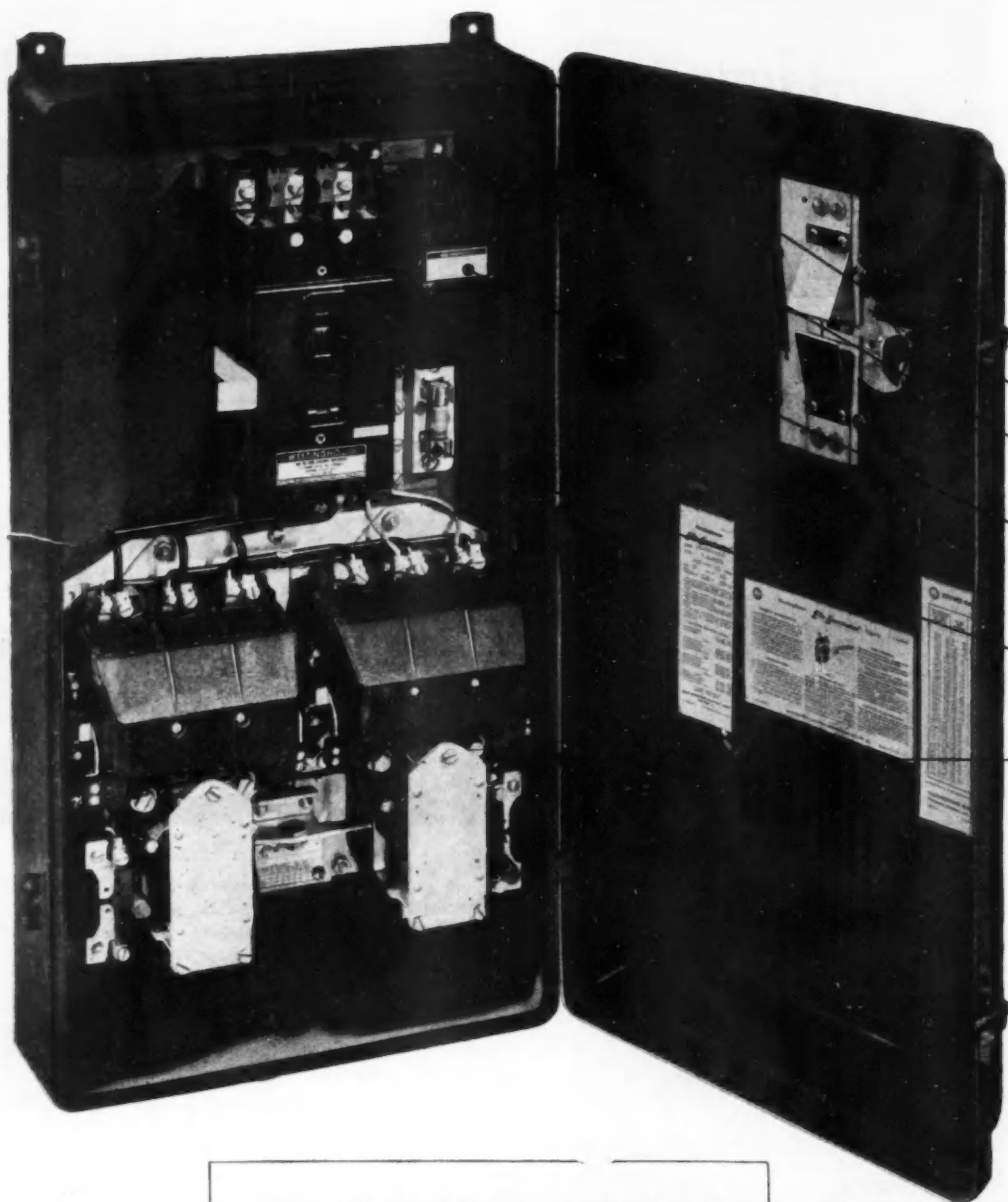
\*REG. U.S. PAT. OFF.

*Get the complete story from our Detroit office.*

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**BENDIX RADIO DIVISION of**  
BALTIMORE 4, MARYLAND





**Class 11-216-NJ25, Reversing Combination Life-Linestarter with Circuit Breaker per JIC Specifications, NEMA Type XII Enclosure, Size 2.**

# MORE MOTOR STARTER

*than your committees specified*

JIC Standards have been established by your own committees for the Automotive, Machine Tool and Mass Production Industries. They've set high and desirable standards. Westinghouse Life-Linestarters are built to the new JIC Standards and also include our own performance features that make for personnel safety, uninterrupted production, longer equipment life.

## HERE'S WHAT JIC STANDARDS INCLUDE:

- ★ **EXTERNAL MOUNTING FEET** help eliminate enclosure openings and facilitate quick and easy hanging.
- ★ **NO KNOCKOUTS** in enclosure—a further safeguard that keeps out oil, dust and dirt.
- ★ **CONTROL CIRCUIT TRANSFORMER WITH DUAL-VOLTAGE PRIMARY** enables starter to be used on either 220 or 440 volts, 60 cycles, with 110-volt control circuit.
- ★ **CONTROL CIRCUIT** is protected by fuse in transformer secondary circuit.
- ★ **CONTINUOUS NEOPRENE GASKET** that helps exclude oil, dirt and dust.

## HERE ARE WESTINGHOUSE PLUS FEATURES:

**SLAMPROOF HANDLE MECHANISM**... protects Breaker against rough treatment... interlocked design keeps cover closed when handle is in either ON or OFF position. Sure-grip handle of high-strength alloy must be moved beyond OFF to the OPEN COVER position to open cover.

**"DE-ION"® ARC QUENCHER**... lengthens contact life and cuts maintenance... destructive arc is confined, divided and quickly extinguished in ½ cycle or less.

**NO COVER RESETS**... eliminate possible entrance of oil and dust... also prevent tampering by

unauthorized personnel. Retained cover screws hold cover tightly closed against gasket.

**INTERLOCKED CONTACTORS**... contactors are electrically, as well as mechanically interlocked.

Add these and other Westinghouse standard features to new improved JIC Standards and you get a Linestarter that's loaded with positive protection for personnel, production and equipment. Get all the information about the new Reversing Combination Life-Linestarters with plain disconnect, fusible disconnect or Circuit Breaker. Your nearby Westinghouse representative has the answers; or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-30074

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**COLD-FLOWS**

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ENGINE BOLTS

to highest degree of Tolerances, Tensile Strength, Quality —  
In High Heat-Resisting Alloys!



## MOST CRITICAL BOLT APPLICATION IN JET-POWER PROGRAM

Sources for Jet-program requirements of this calibre are selected by proven performance. Camcar has the distinction of being a major source chosen for high-volume supply to principal Jet Engine Manufacturers.

Camcar's Cold-Flow techniques and tooling abilities make it possible to meet such rigid requirements of quality, close tolerances and tensile strength — consistently.

AEB identification on each piece assures you of Camcar quality.

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**CAMCAR** SCREW & MFG. CORP.  
606 EIGHTEENTH AVE., ROCKFORD, ILL.

"PRODUCTION-DESIGNED FOR YOUR ASSEMBLY LINE"

## MEN in the NEWS

(Continued from page 76)

Westinghouse Electric Supply Co.—John P. Finneran is now general advertising manager.

Pacific Airmotive Corp., Manufacturing Div.—E. L. Black was recently named acting manager.

Crane Packing Co.—Frank E. Payne has succeeded A. W. Payne as chairman of the board, while Karl V. Rohlen is now president.

Allis Hydraulic Products, Inc. — W. W. Allis is now president and general manager, and G. A. Markuson is vice-president and sales manager.

Goodyear Aircraft Corp. — E. P. Hutchinson was appointed cashier recently.

Ainsworth Manufacturing Corp.—The appointment of T. G. Ingram to the newly created position of controller has been announced.

Cushman Chuck Co. — Harry E. Sloan was elected chairman of the board. Harry E. Sloan, Jr., now becomes president of the company. Other promotions were: Edward L. Field to treasurer, William C. Gaw to vice president in charge of sales, W. Howard Spencer to assistant treasurer, and John L. Way, II, to assistant secretary.

Pacific Airmotive Corp. — Richard M. Robinson has been appointed purchasing agent.

Lockheed Aircraft Corp.—Burt C. Monesmith was elected a vice president. Mr. Monesmith continues his activities as manufacturing manager.

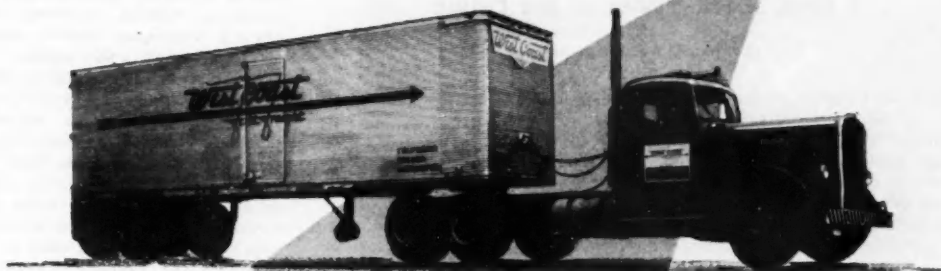
Caterpillar Tractor Co.—Delmar R. Lammers has been appointed service manager to assist in general service administration.

Worthington Corp.—W. A. Finn has been named assistant general sales manager.

Artisan Metal Works Co.—Harlie F. Byrne has been appointed sales manager.

**YOUR JOB IS CLEAR  
—GET IN THE SCRAP  
to keep steel coming**

NON-FERROUS SCRAP is needed tool



## WEST COAST'S **RIGS**

Roll 20,000,000 Miles a Year With the Help of

# SKF

It may be thirty below zero or a hundred and fifteen above—every day, almost a thousand West Coast Fast Freight trucks are covering California, Oregon, Washington, Idaho, Montana, travelling seven thousand miles of highway with general commodities. Their average load rolls 721 miles in a twenty-four-hour-a-day operation. The

fact that West Coast rigs deliver the goods under tough conditions is a tribute to operating wisdom, and to good equipment well maintained. For this maintenance, West Coast depends on SKF Bearings.

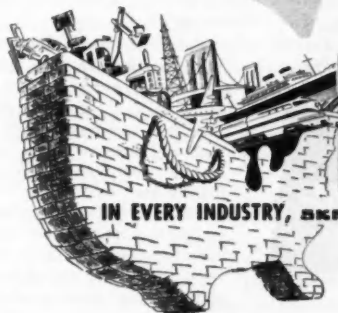
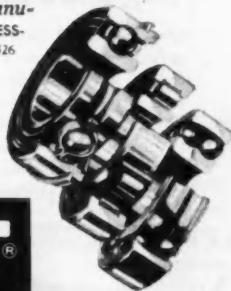
They've learned that, where endurance and dependability are essential, they can depend on SKF.

Designers of heavy-on and off-the-road automotive equipment know these SKF Bearings well. They depend on SKF Single Row Deep Groove Bearings for their ability to sustain combined radial and thrust loads at high speed, for their available combinations of shields and seals which exclude dirt and retain lubricant. They depend on SKF

Cylindrical Roller Bearings for extremely high radial capacity and low friction which perform so well at high speed. And for propeller shaft boxes on heavy duty equipment, designers specify SKF Self-Aligning Ball Bearings.

The teamwork of automotive equipment designers and SKF engineers always produces advanced, dependable equipment. **SKF INDUSTRIES, INC.,**

PHILADELPHIA 32, PA. — manufacturers of SKF and HESS-BRIGHT bearings. 7326



# SKF®

BALL AND ROLLER BEARINGS

IN EVERY INDUSTRY, SKF Puts The Right Bearing In The Right Place



## New Materials Forms Required in High Speed Planes of the Future

(Continued from page 45)

Under the high-temperature conditions postulated in this article, a severe limitation to the application of metallic honeycomb construction is the lack of adequate means of bonding the elements of the honeycomb and attaching the honeycomb structure to the skin or metal sheets com-

posing the sandwich faces. Organic adhesives presently used for this purpose possess very poor heat-resisting characteristics. Even now, design requirements are far in excess of the capabilities of such adhesives. It is, therefore, incumbent upon the airframe industry to develop means of

attaching the elements of metal honeycomb panels which will preclude the use of organic bonding materials. Improved welding, soldering, and brazing techniques should receive special attention in this regard.

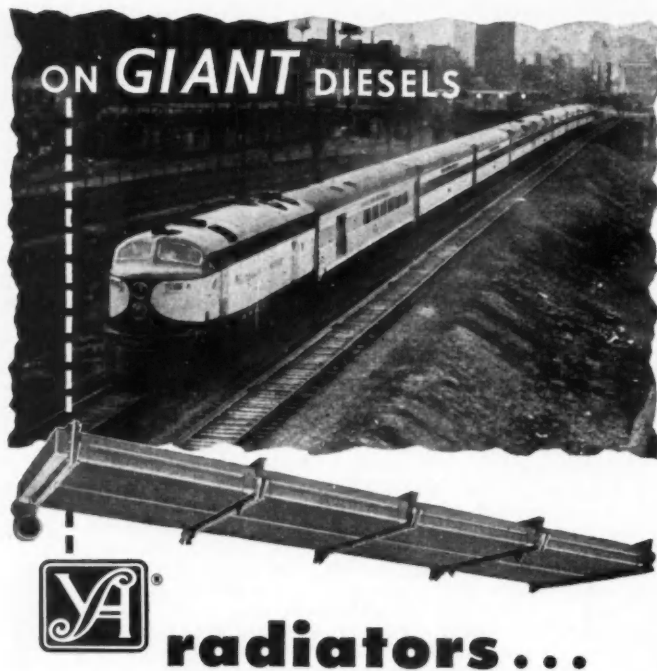
In the ever-more-demanding search for low-density, high-strength airframe structures, much attention should be given to the possibility of new corrugating methods and improved diamond punching. As applications for steel in new forms are developed, new fabrication processes must accompany them in order to reduce cost and expedite production. Large, thin metal castings will undoubtedly play an important role in the construction of future aircraft. Techniques must be developed for making castings in large, thin sections having less than one deg draft angles. Improved foundry practices are needed to produce large, thin (0.1 in. thick), light castings which will replace a multitude of present component parts with a single, integrated unit.

Fuels and lubricants also must change radically to meet the new conditions of speed and heat. There is no noticeable temperature rise in the fuel system of the F-89 during flight. But at two or three times the speed of sound it will be necessary to find means of preventing hydrocarbon engine fuel from boiling. Various methods of refrigerating the fuel tanks have been suggested. The need is to develop a readily available fuel having such a low vapor pressure that it will not boil at the temperature produced in the fuel system by the ram temperature increase.

Future high-temperature lubricants will probably be of the metallic dry-powder or dry-film type such as molybdenum disulfide, with or without a carrier. Wet lubricants developed to give service in the range from 350 to 700 F will quite probably be unsatisfactory for extreme low-temperature operation; they may also exhibit rather poor lubricity or have undesirable toxic or corrosive properties.

For the military aircraft of tomorrow the methacrylate plastic now used in the canopy enclosing the cockpit must be changed to silicate glass. New heat-resisting rubber-like materials will have to be developed for all sealing applications. New surface finishes also must be developed. High-speed aircraft of the future must maintain a more nearly perfect surface than the finest piano made today.

The materials evolution necessary to implement production of the air-



On giant diesel locomotives . . . one of the toughest of all radiator applications as far as space limitations, power concentration, and vibration characteristics are concerned . . . you'll find Yates-American radiators specified as the radiators that can take rough going, and like it! So whatever your products . . . if you require the best in radiators, write today for complete information and descriptive literature on Yates-American radiators for all purposes.

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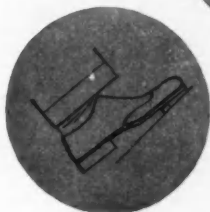
Whatever Your Starting Requirements

# *Bendix* STARTER DRIVE

MORE EFFICIENT!



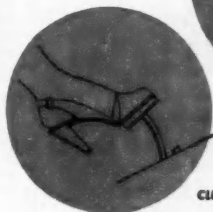
PUSH BUTTON



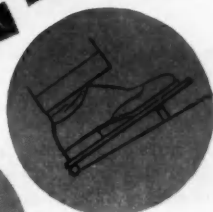
FLOOR BUTTON



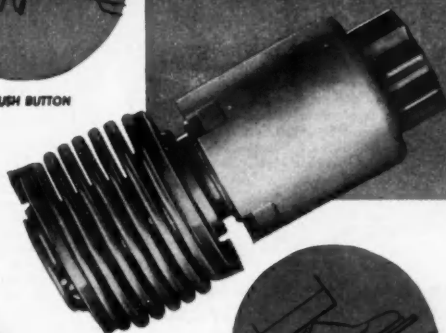
SWITCH KEY



CLUTCH PEDAL



ACCELERATOR



**SPECIALISTS  
IN ALL TYPES OF  
STARTING!**

More than a quarter of a century ago, Bendix pioneered the starter drive. Today, and over 85,000,000 drives later, Bendix is still starter headquarters for industry. In automotive vehicles of all types, in the marine field, in stationary engines and aircraft, in fact wherever motors start, Bendix\* Drives have established an unrivaled record for dependable performance. Perhaps even more remarkable is the fact that in most installations manufacturers have paid less for the Bendix Drive than for other types.

This unique combination of dependable performance

and low cost is made possible by Bendix exclusive design features. For example, the Bendix Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—the starting motor can be mounted more easily and in more positions. Also the Bendix Drive has fewer parts and needs fewer adjustments.

If you want true economy from installation to service, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drives. Your inquiry will receive immediate attention. \*REG. U.S. PAT. OFF.

**ECLIPSE MACHINE DIVISION of  
ELMIRA, NEW YORK**

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.



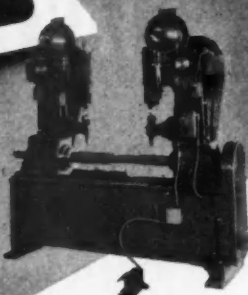
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**T-J**

**DOUBLE RIVITORS  
AND CLINCHORS!**

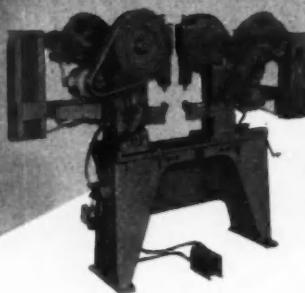
#### RIVITORS

Set two rivets at a time with this new T-J Dual Rivitor! This machine is equipped with 10" hoppers, and loaded to automatically feed and set two 1/8" dia. x 3/8" long wagon box head rivets at a time in elevator chain and rod or elevator flight assemblies for farm implements. Controlled by one foot pedal.



#### CLINCHORS

Set two nuts at once with the new T-J Double Clinchor! This machine is loaded to feed and set 3/8" x 1/2" x 3/8" thick Fabri-Steel nuts at each operation. Both Clinchors are tripped by the same foot-operated valve. Adaptable to a wide range of clinch nut setting problems.



Save labor . . . speed up production with T-J Rivitors and Clinchors adaptable to a wide range of assembly jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds!

**T-J Clinchors** set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

**T-J Rivitors** automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets 1/16" to 1/4" diam. solid steel rivets up to 3/8" long. Air-powered Rivitor sets aluminum alloy rivets up to 1/4" diam. or steel rivets up to 1/8" diam. and up to 3/4" long. Throat depths 8" to 36"

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Company, Jackson, Mich.



T-J Rivitor used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembly, setting, inspecting and ejecting.

**36 YEARS EXPERIENCE**

**TOMKINS-JOHNSON**

RIVITORS, AIR AND HYDRAULIC CHAINERS, CUTTERS, CLINCHORS

plane envisioned in Fig. 1 will be accomplished only through a carefully planned and vigorously executed program of research and development. Achieving the new material forms will take time, money and, above all, work. But the fruits of the development program will not redound to the benefit of the airframe companies alone. Industries which will find application for the new products may be numbered by the score.

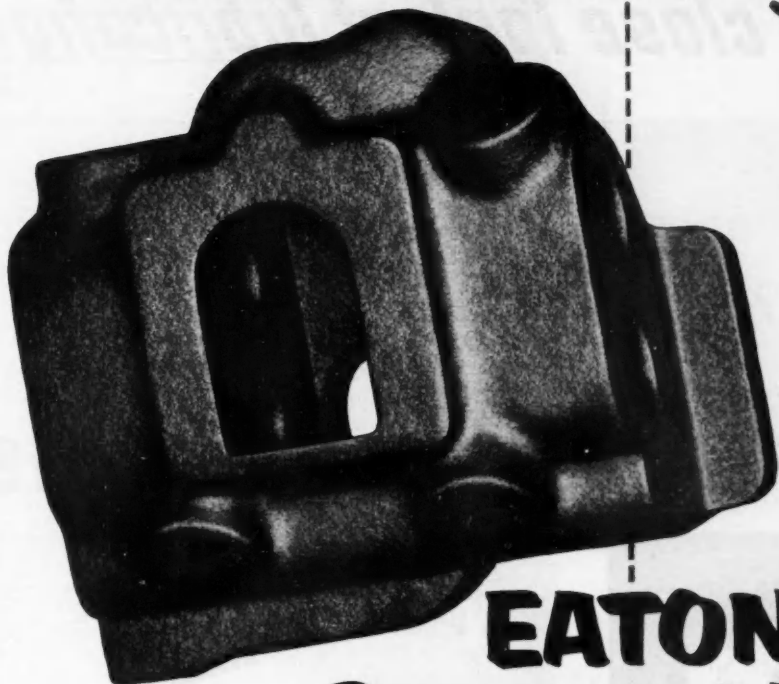
## BOOKS . . .

**AIR TRANSPORTATION MANAGEMENT** by Joseph L. Nicholson, published by John Wiley & Sons. Intended as a reference source for those who look to the commercial airlines for a career or an investment, this book is said to be unique in emphasizing day-by-day operations as well as long term profit and losses of the airlines. Special stress is laid on the part played by government in this industry. On the technical side, the author covers safety, meteorology and communications, and equipment and maintenance policies, including the selection of planes and engines as well as the effects of future developments.

**HELICOPTER ANALYSIS** by Alexander A. Nikolsky, published by John Wiley & Sons. Said to be one of the leading authorities on rotary wing aircraft, the author has presented a general physical picture of helicopter theory in this text which is based upon recent lectures to graduate students in the Aeronautical Engineering Department at Princeton. Parts of the book represent the author's original analysis, other sections deal with an interpretation of the contributions of others in this field. In general, the purpose is to provide a possible approach to some basic helicopter problems. Heart of the book is in the chapters on dynamic stability and control, part of the stability theory being entirely new to the literature. Where gaps exist in theory, the author has filled them with assumptions and simplifications based upon his own experience. Major chapter headings include: airscrew theory; helicopter in steady flight; hinges, flapping, and feathering systems; forward flight; mathematical analysis of dynamic stability; theory of dynamic stability and control; elastic analysis of rotor blades.

**INDUSTRIAL FURNACES, VOLUME I, FOURTH EDITION**, by W. Trinks, published by John Wiley & Sons. The fourth edition of what is generally recognized as the "bible" for practicing engineers on the design and operation of industrial furnaces incorporates the most recent scientific facts known to the art in the field of heat transfer, furnace design, and operating principles and techniques. Apart from revisions that bring the text matter up to date, the arrangement remains substantially the same as for the previous edition. The new edition is particularly timely in view of the current military program and with it the need for maximum utilization of fuels. Principal chapter headings are as follows: heating capacity of furnaces; fuel economy; heat saving appliances; strength and durability of furnaces; movement of gases in furnaces. The appendix has been completely revised and is more extensive due to the inclusion of some material formerly routed in the text section.

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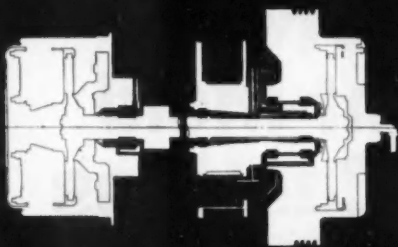
Gap Frame



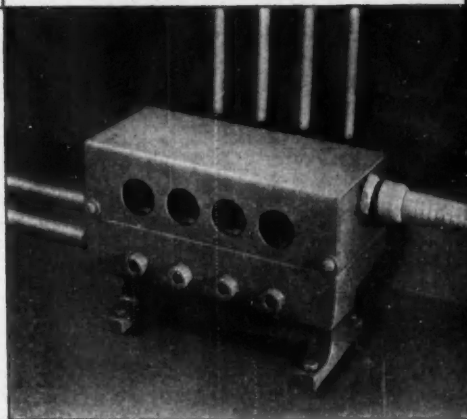
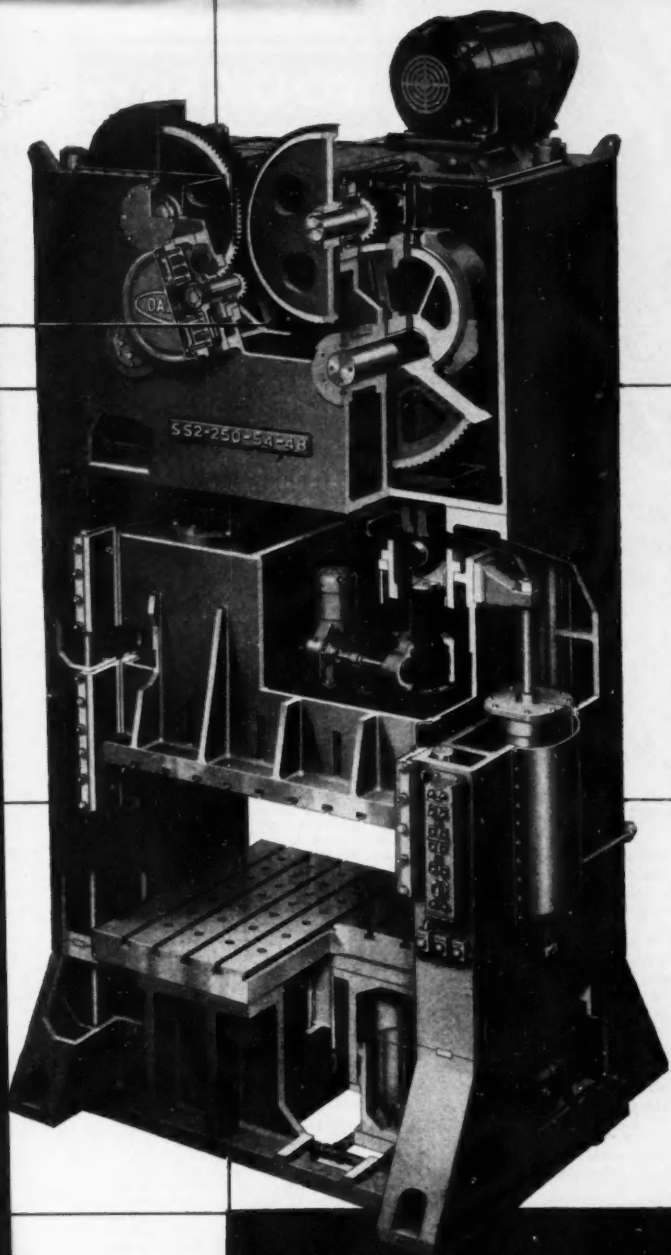
Double Action  
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### **POSITIVE OIL LUBRICATION—ELECTRICALLY CONTROLLED**

Diagram at left indicates important drive shaft bearing lubrication system. Oil, shown in color, is piped under pressure to the bearings—all anti-friction type. Any drop in oil pressure below normal operating levels in this completely automatic system stops the press—positive protection against damage due to lack of lubrication.







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#### **CONTINUOUS AUTOMATIC OIL LUBRICATION INCLUDES GIBS**

Cutaway at left shows how Danly Presses provide complete automatic lubrication (in color) to the drive mechanism and slide—including gibs.

- Maintenance is reduced by preventing needless breakdowns arising from irregular or insufficient lubrication.
- Oil supplied continuously under pressure to gibs permits extremely close slide adjustment—prolonging die life.



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HYDRAULIC METALWORKING EQUIPMENT

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**A** ALWAYS  
MAKES  
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PRODUCTS  
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## BOOKS...

**THE SCIENCE OF FLAMES AND FURNACES** by M. W. Thring, published by John Wiley & Sons. A refreshing slant on industrial furnace operation, this book should be of interest to research engineers as well as manufacturers practicing statistical quality control. The author, head of the physics department, British Iron and Steel Research Association, has designed the text matter with a view to encouraging the application of existing knowledge of thermodynamics, heat transfer, and turbulence theory to the design and management of furnaces of all kinds in the hope that the furnace of the future may become a precision tool, reliably controlled by scientific instrumentation. The author is concerned with equipment such as used in foundries, steel mills, glass works, heat treating, etc., and has limited the text to a coverage of equipment heated by flame rather than electricity. According to the author, the text aims at three major objectives—to stress the gap between the fundamental sciences and industrial furnace design and use; to stress diagnosis of ailments of existing equipment by scientific methods; and finally to present the subject in such fashion as to attract the interest of scientists as well as engineers.

**AMERICAN CAPITALISM, The Concept of Countervailing Power**, by John Kenneth Galbraith, published by Houghton Mifflin Co., 3 Park St., Boston, Mass. Price, \$3.00. This is an economics book that is easy to read, but its boldness and penetration and the originality of its central thesis are so marked that it is destined to be a landmark for the professional economist. It states that we are the captives of economic doctrines that no longer apply to our current life. In the place of the ideas that first filled the vacuum after the disintegration of classical economics—ideas which still owed much to the doctrine of competition—Mr. Galbraith advances a new conception of economics based on the principle of "countervailing power." This he identifies as the balance wheel of the modern economy. This new system of economics recognizes the contribution of Keynes and other modern writers, but at the same time highlights the serious limitations on their analyses. The fait accompli of government's concern with the economy is more comfortable when limits are set to this involvement.

**METALLURGY FOR ENGINEERS**, by Welf, Taylor, Shaler, published by John Wiley & Sons. Prepared by a group of specialists from the Department of Metallurgy at MIT, this book is a formalization of the course in metallurgy for engineering students at MIT. It may be considered an outline or survey text since it is intended to teach the principles that should enable an engineer to properly evaluate materials and their processing. Similarly, in the case of the practicing engineer, it is not a source book as much as it is a refresher on the latest concepts and developments in this important specialty. The first part of book covers the concepts and fundamentals of metallurgy as they apply to engineering materials; the second part takes up the various processes such as casting, forging, welding, etc. For practicing engineers the new book should provide a fresh slant on the latest concepts and techniques in outline form and without being subjected to the mass of scientific data required by the chemist or metallurgist.



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The battle to transform generated power into the highest measure of applied traction is unending in the automotive industry. In this project, Spicer for 48 years has invented, developed and perfected power transmission units that have delivered outstanding performance in peace and war. We are dedicated to the service of the nation...helping to assure better, lower-cost transportation in the automobile, truck, bus, tractor, railway and airplane fields.



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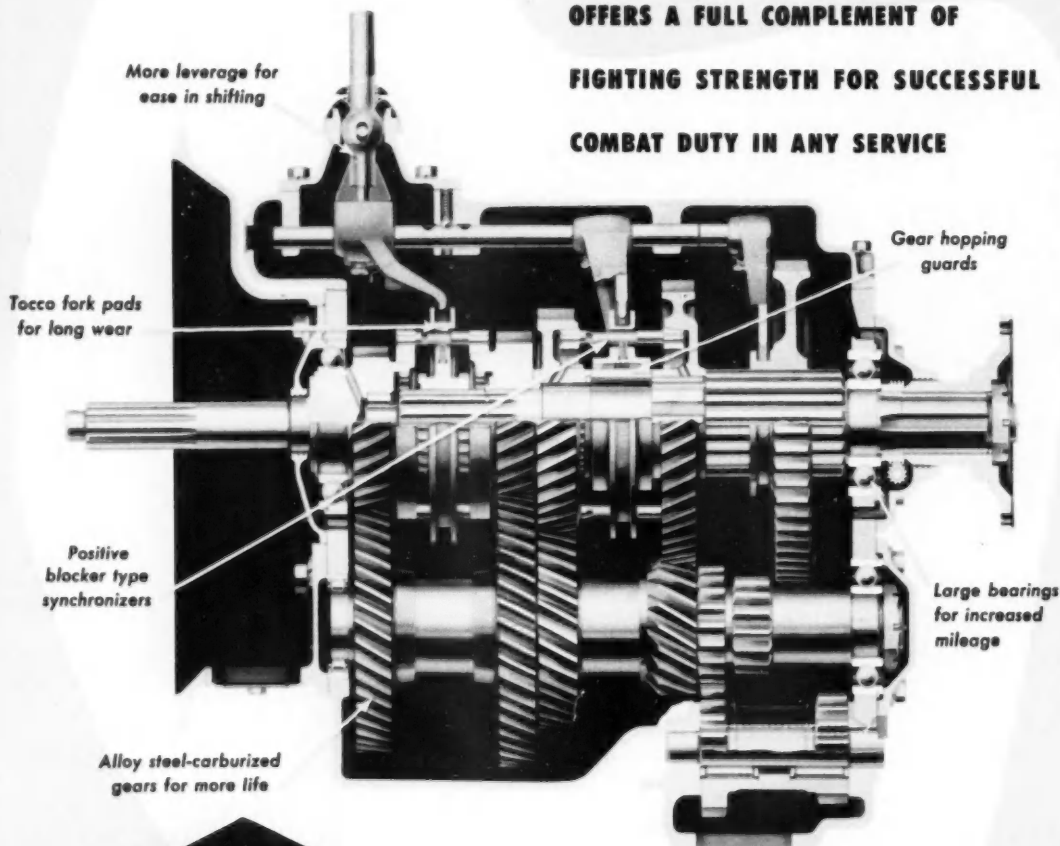
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# CALENDAR

## OF COMING SHOWS AND MEETINGS

Association of National Advertisers,  
Hotel Plaza, New York, N. Y. ....Sept. 22-Oct. 1

16th Commercial Show, Earls Court,  
London, England .....Sept. 26-Oct. 4

SAE National Aeronautic Meeting,  
Los Angeles, Calif. ....Oct. 1-4

Paris Automobile Show, Paris,  
France .....Oct. 2-12

Annual Meeting of Controllers In-  
stitute, Sheraton-Cadillac Hotel,  
Detroit, Mich. ....Oct. 5-8

American Society of Tool Engi-  
neers, International Area, Hotel  
Statler, Buffalo, N. Y. ....Oct. 10-11

Society of Industrial Packaging and  
Materials Handling Engineers,  
7th Annual Exposition, Chicago,  
Ill. ....Oct. 13-16

National Safety Congress, Chicago,  
Ill. ....Oct. 20-24

National Metal Show, Convention  
Hall, Phila., Pa. ....Oct. 18-24

37th International Motor Exposition,  
London, England .....Oct. 22-Nov. 1

SAE Transportation Meeting, Pitts-  
burgh, Pa. ....Oct. 22-24

American Gear Manufacturers As-  
sociation, semi-annual meeting,  
Edgewater Beach Hotel, Chi-  
cago, Ill. ....Oct. 24-29

Transport Aircraft Hydraulic Con-  
ference, Park-Sheraton Hotel,  
Detroit, Mich. ....Oct. 28-29

American Society of Body Engi-  
neers, Seventh Annual Techni-  
cal Convention, Rackham Bldg.,  
Detroit, Mich. ....Oct. 29-31

SAE National Diesel Engine Meet-  
ing, St. Louis, Mo. ....Oct. 30-31

Montreal Tool and Equipment  
Show, Show Mart Building,  
Montreal, Canada .....Nov. 11-14

16th Annual Time and Motion Study  
and Management Clinic, Indus-  
trial Management Society,  
Sheraton Hotel, Chicago, Ill.  
Nov. 5-7

SAE National Fuels and Lubricants  
Meeting, Mayo Hotel, Tulsa,  
Okla. ....Nov. 6-7

Third Annual International Moto-  
rama, Los Angeles, Calif. ....Nov. 7-16

API 32nd Annual Meeting, Conrad  
Hilton Hotel, Chicago, Ill. ....Nov. 10-13

American Institute of Electrical En-  
gineers Conference on Record-  
ing and Controlling Instru-  
ments, Benj. Franklin Hotel,  
Phila., Pa. ....Nov. 17-18

7th Midwest Conference, American  
Society for Quality Control,  
Claypool Hotel, Indianapolis,  
Ind. ....Nov. 29-31

Society for Experimental Stress  
Analysis, Annual Meeting and  
Exhibition, Hotel McAlpin,  
New York, N. Y. ....Dec. 3-5

National Standard Parts Association  
Congress, Ambassador Hotel,  
Atlantic City, N. J. ....Dec. 8-9

Automotive Service Industries Show,  
Atlantic City, N. J. ....Dec. 10-13

1953

SAE Annual Meeting, Sheraton-  
Cadillac Hotel, Detroit, Mich.  
Jan. 12-16

Plant Maintenance Show, Public  
Auditorium, Cleveland, Ohio.  
Jan. 19-22

National Transport Vehicle Show  
and Fleet Maintenance Exposi-  
tion, New York, N. Y. ....Feb. 24-27

Pacific Automotive Show, Civic  
Auditorium, San Francisco,  
Calif. ....Feb. 26-Mar. 1

American Society for Testing Mate-  
rials, Spring Meeting, Detroit,  
Mich. ....Mar. 2-6

National Association of Corrosion  
Engineers Ninth Annual Con-  
ference and Exhibition, Hotel  
Sherman, Chicago, Ill. ....Mar. 16-20

German Vehicle Show, Frankfurt,  
Germany .....Mar. 19-29

Eighth Western Metal Congress,  
Pan-Pacific Auditorium, Los  
Angeles, Calif. ....Mar. 23-27

Fifth Materials Handling Exposi-  
tion, Convention Hall, Philadel-  
phia, Pa. ....May 13-22

American Society for Testing Ma-  
terials, Chalfonte-Haddon Hall,  
Atlantic City, N. J. ....June 29-July 3

Eighth National Instrument Con-  
ference and Exhibit, Chicago,  
Ill. ....Sept. 21-25

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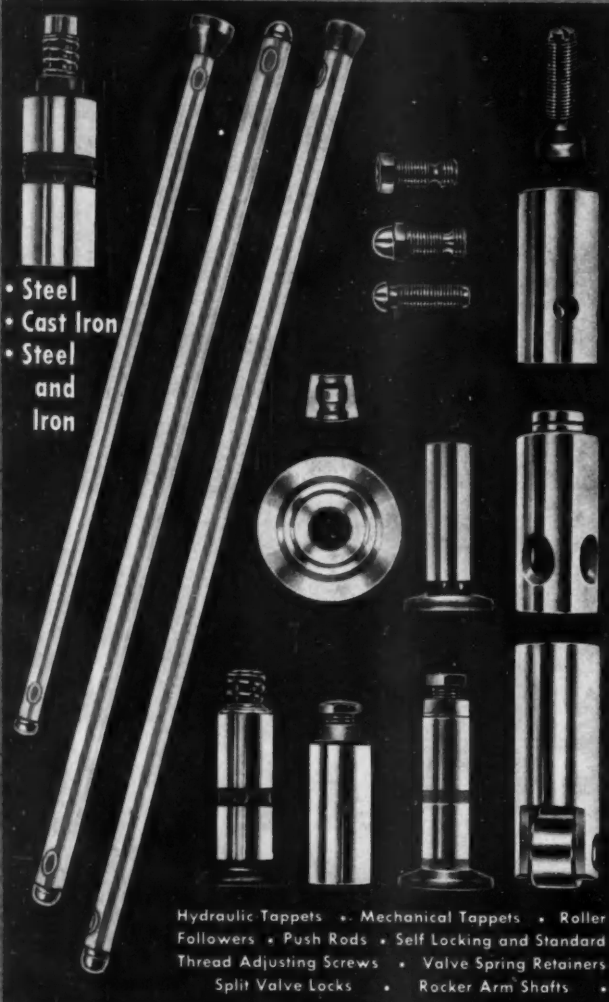
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SCREW COMPANY**  
2801 WASHINGTON BLVD.  
BELLWOOD, ILL.  
Established 1872

## Special Conveyor Setup

(Continued from page 49)

buildings. About 200 ft of the system is outdoors, travelling within a covered passageway for protection against the weather.

In addition to the heavy duty conveyor, Reo has in operation a new four-in. rail conveyor system, running some 3200 ft, connecting the two press plants, sheet metal fabrication departments, and cab and chassis assembly departments. Operated by three power drives, this conveyor winds its way through nine buildings and up and down three floor levels.

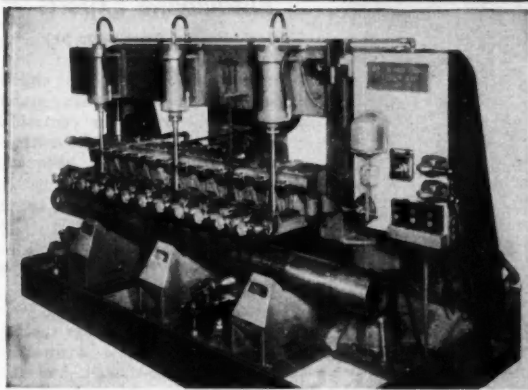
It has 20 slings into which skid boxes and pallets weighing 1000 lb each are loaded by fork trucks while the conveyor is in motion as in the case of the heavy duty line. Special hangers and hooks are provided for carrying every item of sheet metal produced in this plant. In addition, it carries wire baskets of various sizes to accommodate other parts.

This conveyor has a capacity of 1,200,000 lb in each eight-hour shift, and travels at the rate of 30 fpm.

An interesting feature of this conveyor system is that it has aided in organizing the fabrication of sheet metal parts, many of which are handled in job lots. The conveyor traverses the main press line galleries where equipment is too heavy to move. However, a large variety of secondary equipment such as small punch presses, drill presses, turret lathes, welding machines, assembly fixtures, etc., are moved to the fixed machines by industrial trucks or tractors to complete the necessary equipment line-up for a given operation. This procedure facilitates completion of all operations on small lot production at a fixed station without making it necessary to route a large variety of parts throughout the plant and from one floor to another. It also permits operators to handle all of the material required for a given job, thus eliminating extra stock handling.

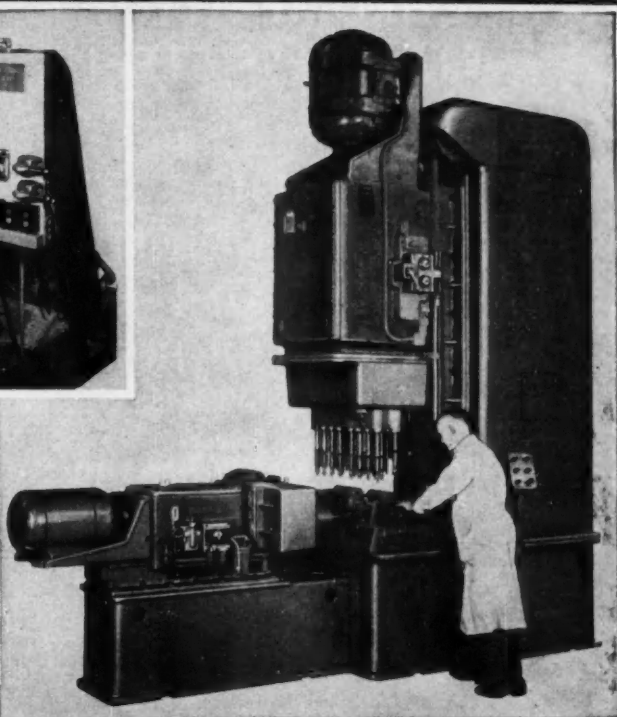
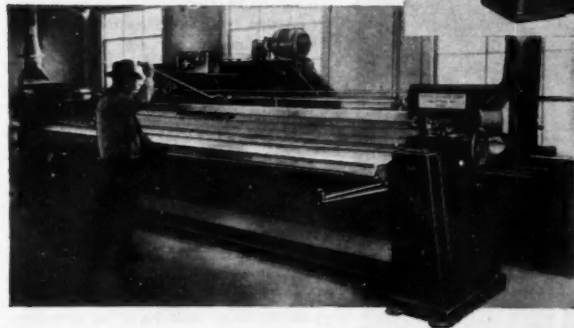
While on the subject of the press shop operation, it is noteworthy that Reo has developed a simple but effective method of preventing damage to presses and other heavy equipment and has eliminated die breakage in the event of overload or unusual trouble. To this end the flywheels of all heavy equipment are removed and bored out to provide clearance be-

# MORE COST-CUTTING APPLICATIONS OF **VICKERS** HYDRAULICS



Oil well casing slotting that formerly cost \$1.25 per foot is now done at \$0.90 per foot on the new machine designed and built by Allen Machine & Tool Co., Compton, California. Vickers hydraulic equipment raises and lowers the feed rail, controls feed rate and rapid traverse of cutters.

Hydraulic unit converted old belt sander to modern automatic stroke sander and reduced time for sanding pew backs from 15 minutes to 1½ minutes. Also improved quality. Built by Curtis Machine Corporation, Jamestown, N. Y. Vickers Hydraulics used exclusively.



This four-way, 38 spindle special purpose machine by Modern Tool Works, Ltd., Toronto, Ontario, does the drilling, spot facing and chamfering operations on an automobile engine head at the rate of one per minute. Vickers Hydraulic helps give it speed, control and precision.

Every day more and more machines are increasing production and cutting costs with the help of Vickers Hydraulics. See for yourself what Vickers Hydraulics can do for you ... write for Catalog 5000 or call in a factory trained Vickers application engineer.



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CORPORATION

BOX 488 • MIDDLETOWN, OHIO

tween the hub bore and the shaft. Then the steel key is removed and replaced with a brass alloy key. This key is milled part way through at the center to further reduce its load-carrying capacity. Consequently, in the event of an unusual overload or seizure the key will shear before damage can be done to the machine or the tooling.

## Automobile Exports

(Continued from page 51)

Future developments are chiefly dependent on the plans of four major companies—all owned or controlled by U. S. interests—and United Kingdom manufacturers who have assembly or body building plants in Australia. They are all working on long-term plans to expand. Only one company substantially owned by Australian interests — Hartnett Motor Co. Ltd.—is in the production field.

Greatest obstacle to general expansion in the industry, says the review, is economic. The Australian market is relatively small, and the export market available to local producers still unexplored. Whether the country is to aim at becoming a substantial exporter must depend largely on policy decisions by overseas companies controlling the Australian producers.

Shortage of dollars will continue to influence developments, and that is the chief reason for the dominance of British vehicles. But, says the report, the range of family-sized cars produced by British manufacturers since the war might be expected to offer more competition with American-type vehicles if the latter return to the market.

Most important of the plans, from the national viewpoint, is the expanded production of heavier-type vehicles along with engine blocks, engine parts, and transmissions. These will greatly increase the versatility of the industry, in its direct products and in its influence on the economy and defense potential.

The report affirms that if Australian manufacturers and assemblers are to maintain their rates of expansion they will have to overcome the problem of rapidly rising costs. They can expand the market rapidly only by producing at substantially lower selling prices.

The general trend of demand, added to the expansion plans of the various companies, points to a much more competitive market in Australia over the next decade.



# UPSWING

*in Speed and Accuracy*

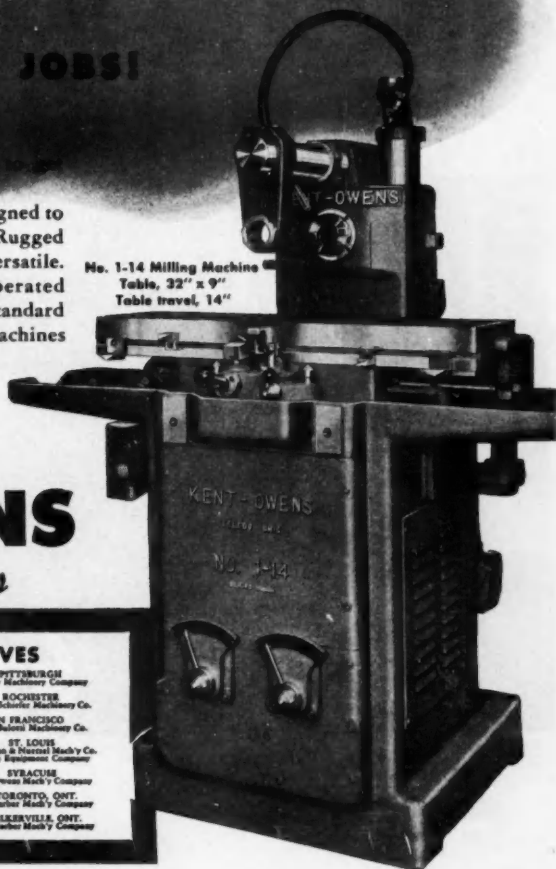
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They're rapid . . . accurate . . . efficient. Designed to help you *produce more . . . with lower costs!* Rugged and dependable in every detail. Practical and versatile.

A wide range of hydraulic and hand operated machines are available in the Kent-Owens Standard line. Let Kent-Owens engineers recommend machines and tooling best suited to your requirements. Write for details. Kent-Owens Machine Co., Toledo, Ohio.

No. 1-14 Milling Machine  
Table, 32" x 9"  
Table travel, 14"



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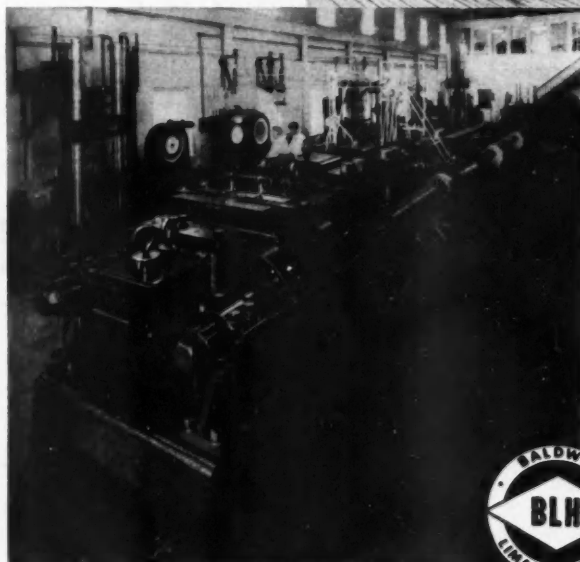
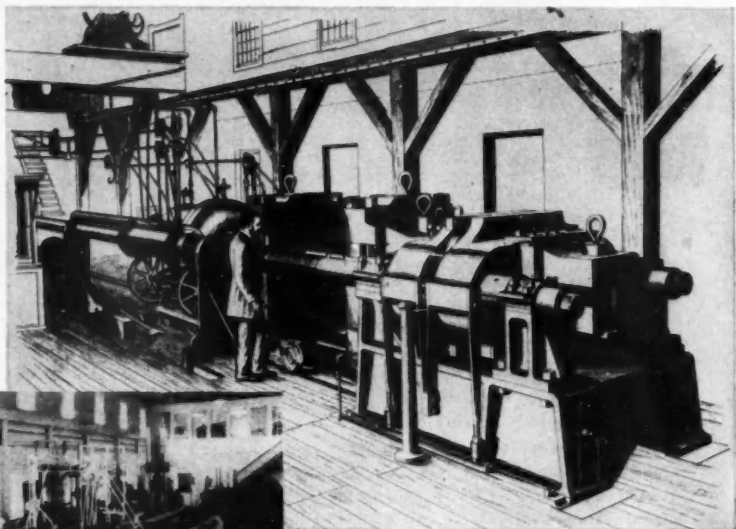
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*for Milling Machines*

### KENT-OWENS REPRESENTATIVES

<b>BOSTON</b> General Machinery Corp.  <b>BUFFALO</b> Don W. Patterson  <b>CHICAGO</b> Four States Mach'y Co.  <b>DALLAS</b> Hazen Machine Tool Co.  <b>DAYTON</b> Gardner Mach'y Company  <b>DETROIT</b> A.C. Hildebrand Mach'y Co.  <b>FT. WAYNE</b> Dale Machinery Co.  <b>GRAND RAPIDS</b> Joseph Mowbray	<b>HAMILTON, ONT.</b> F. F. Barber Mach'y Company  <b>HARTFORD</b> Hartigan-Wilson-Brown Co.  <b>HOUSTON</b> Oliver H. Van Horn Co., Inc.  <b>INDIANAPOLIS</b> Gale Machinery Co.  <b>KANSAS CITY</b> Richman Machinery Co.  <b>LOS ANGELES</b> Richter & Co., Inc. Mach'y Co.	<b>MILWAUKEE</b> Four States Mach'y Co.  <b>MINNEAPOLIS</b> The Sauer Company  <b>MOBILE</b> John J. Homestead Co.  <b>MONTREAL</b> F. E. Barber Mach'y Co.  <b>NEW ORLEANS</b> Oliver H. Van Horn Co., Inc.  <b>NEW YORK</b> Harrington-Wilson-Brown Company  <b>PHILADELPHIA</b> Cable Machinery Company	<b>PITTSBURGH</b> Boney Machinery Company  <b>ROCHESTER</b> F. W. Schuler Machinery Co.  <b>SAN FRANCISCO</b> C. F. Butler Machinery Co.  <b>ST. LOUIS</b> Richman & Harnett Mach'y Co. Cable Equipment Company  <b>STRAUSBURG</b> J. F. Owens Mach'y Company  <b>TORONTO, ONT.</b> F. F. Barber Mach'y Company  <b>WALKERVILLE, ONT.</b> F. F. Barber Mach'y Company
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# GRANDPA



When he built this 1,000,000 lb. testing machine, A. H. Emery had to meet specifications of unheard of rigidity. For example, after a test under full load, a precision measurement had to be made under a very light load.

Yet acceptance tests were a complete success, for this famous testing machine first broke a wrought iron link 5 inches in diameter at 722,800 lbs. Then it broke a 0.0007" diameter horsehair at one pound... exactly the breaking point determined by other methods.



BALDWIN SELLS PRECISION

## **BALDWIN**

TESTING HEADQUARTERS





# got a TRANSFUSION!

... and became a  
better testing machine

Old Mr. Testing Machine himself is this 72-year giant at Watertown Arsenal. He's one of our favorite grandparents for he fathered an important line of Baldwin testing devices.

Unfortunately Grandpa was a mite slow by today's standards—even though he was as precise and accurate as ever. So recently he got the rejuvenation treatment—a transfusion of four new Emery hydraulic load cells, a new Tate-Emery control system and a new pump (oil, of course).

Now Grandpa is *one* step ahead of the best of them.

There's a point to this story! . . . it shows why it pays to buy a Baldwin testing machine.

Today we design our testing machines just as sturdily as A. H. Emery. We still build-in a big extra-margin of safety to give extra-strength and stability. We build so you can easily bring them right up-to-date even in the distant future.

As new faster elements are invented, we engineer them to fit older machines. In addition, we have the widest range of accessories to extend the field of usefulness of every Baldwin testing machine—no matter how old.

"It pays to buy the best"—a Baldwin testing machine.

SO BALDWIN BUILDS WITH **extra-precision**

## **-LIMA-HAMILTON**

Philadelphia 42, Pa. • Offices in Principal Cities  
In Canada: Peacock Bros., Ltd., Montreal, Quebec



# New Defense Facilities

**S**UPPLEMENTING the list of Certificates of Necessity issued up to July 21 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the August 15 issue, page 97, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Defense Production Adminis-

tration between July 21 and August 20.

Included in this latest tabulation, 13,272 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being \$21,941,646,288. These figures are exclusive of cases that are up for later review but included in this list—in these cases no dollar amount is

listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

## — A —

**The A. C. Gilbert Co., Erector Square, Conn.**  
Ordnance—\$2,284 (65)

**Aeroaffiliates, Fort Worth, Tex.**  
Aircraft parts—\$75,805 (65)

**Aeronca Manufacturing Corp., Middletown, Ohio**  
Aircraft parts—\$21,017 (70)

**Air Cruisers Co., Monmouth County, N. J.**  
Aircraft accessories—\$170,000 (40)

**Aircraft & Automotive Products Co., Wichita, Kans.**  
Components for military end items—\$68,795 (55)

**Aircraft Engineering Products, Inc., Clifton, N. J.**  
Aircraft parts—\$29,207 (65)

**Aircraft Precision Products, Inc., Oak Park, Mich.**  
Aircraft parts—\$9,873 (45)  
Aircraft parts—\$29,000 (45)  
Aircraft parts—\$36,876 (70)

**Airdraulics Co., Pasadena, Calif.**  
Aircraft parts—\$10,026 (65)

**Airesearch Mfg. Co. of Ariz., Phoenix, Ariz.**  
Aircraft accessories—\$213,077 (65)

**Airesearch Manufacturing Co., Los Angeles, Calif.**  
Aircraft parts—\$59,219 (60)

**American Bosch Corp., Springfield, Mass.**  
Aircraft parts—\$171,096 (65)

**American Brake Shoe Co., Chicago, Ill.**  
Ordnance—\$105,568 (65)

**American Locomotive Co., Schenectady, N. Y.**  
Ordnance—\$96,000 (40)

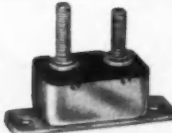
**American Non-Gran Bronze Co., Berwyn, Pa.**  
Aircraft parts—\$99,963 (70)

**Amgears, Inc., Chicago, Ill.**  
Gear assemblies for military end items—\$15,279 (70)

**Arcturus Manufacturing Corp., Venice, Calif.**  
Aircraft forgings—\$296,525 (55)

**AVCO Mfg. Co., Lycoming-Spencer Div., Williamsport, Pa.**  
Aircraft parts—\$80,132 (50)

(Turn to page 134, please)



Fasco Automotive Reset  
Circuit Breaker



Fasco Hydraulic  
Stoplight Switch



Fasco Directional  
Signal Flasher

## Tiny **FASCO** parts help build BIG reputations . . .

Some of the smallest parts are big factors in helping a car earn and keep a good reputation.

For example, Fasco circuit breakers, hydraulic stoplight switches, and directional signal flashers are doing their part in making leading cars, trucks, and buses even more dependable.

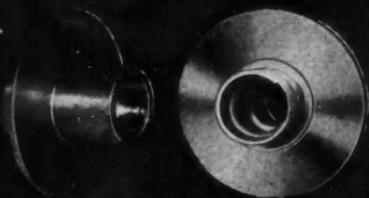
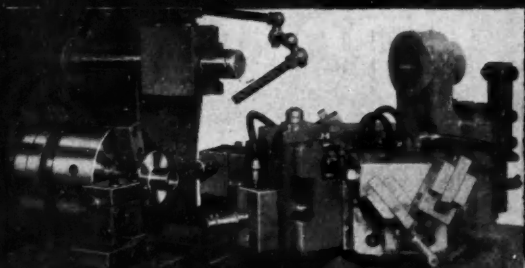
If you haven't started using *all three* Fasco automotive products, find out their advantages for you.

# **FASCO** Industries, Inc.

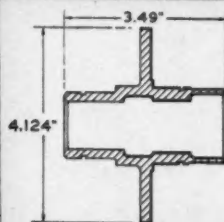
Formerly F. A. SMITH MFG. CO., INC.

ROCHESTER 2, N. Y., U. S. A.

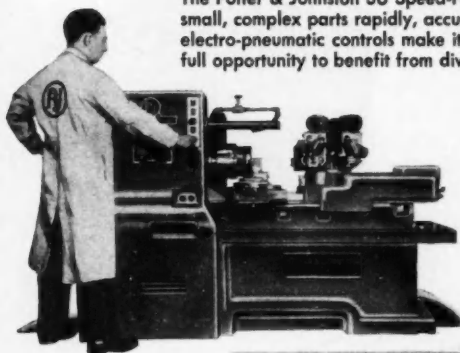
# Lower UNIT COSTS



## POTTER & JOHNSTON 3U SPEED-FLEX



All the surfaces of this steel forging (indicated by heavy lines) were precision machined in one operation.



The Potter & Johnston 3U Speed-Flex Automatic Turret Lathe is specifically designed to machine small, complex parts rapidly, accurately and economically. Completely automatic operation and electro-pneumatic controls make it easy for one man to handle several machines, affording you full opportunity to benefit from divided labor costs. High spindle speeds and ample power take full advantage of fast-cutting carbide tools. Rugged, rigid, high precision construction assures long life, lasting accuracy and a full return on your investment. Meet today's demand for greater output at lower cost with a Potter & Johnston Automatic Turret Lathe equipped with expert P&J Tooling.

See for yourself how the 3U Speed-Flex can bring new standards of efficiency and economy to your difficult chucking and turning jobs. Send today for your copy of Bulletin 145 that contains complete data, specifications and a pictorial description of the Model 3U and all its advanced engineering features.

**POTTER & JOHNSTON**  
COMPANY  
PAWTUCKET, RHODE ISLAND



SUBSIDIARY OF PRATT & WHITNEY



DIVISION NILES - BEMENT - POND CO.

# CUTTING 20 GAGE and $\frac{5}{8}$ " PLATE SIDE-BY-SIDE AT ONE STROKE



*Photograph shows operators cutting  $\frac{5}{8}$ " plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.*

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration. Visitors at our plant can see this done every day. There is no necessity for tinkering with the knife adjustment.

*Demonstrates The Sound  
Engineering Design of*

# NIAGARA

## POWER SQUARING SHEARS

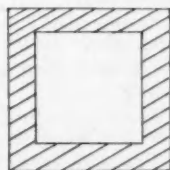
● There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

Accurate cutting depends primarily on rigidity of the shear's components. For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

**NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.**

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

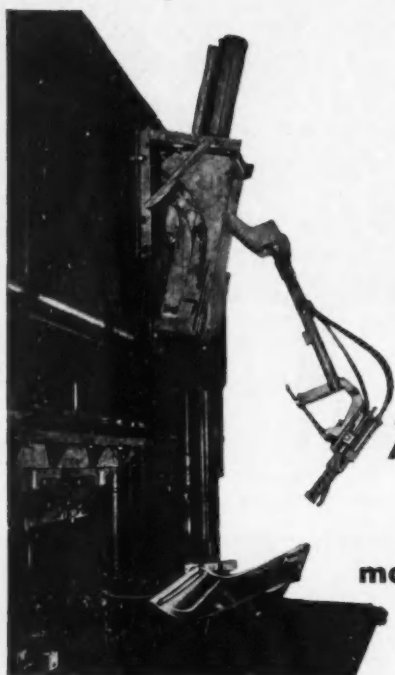
The economy of quality is remembered long after price is forgotten.



**BED, CROSSHEAD & HOLDDOWN DESIGN**

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK  
DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK





## "IRON HANDS"

unload

*Nash* stampings

safer, faster,

more economically

Door panels and other large stampings for Nash automobile bodies are unloaded automatically at the Milwaukee body plant of Nash Motors. The Sahlin "Iron Hand" replaces slow and dangerous manual handling of these hard-to-handle stampings.

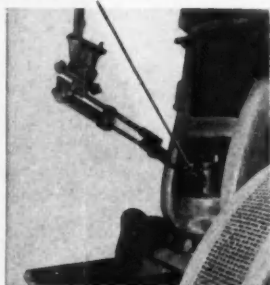
Automatic unloading offers distinct cost advantages because its added speed

guarantees maximum press cycle output. A Sahlin "Iron Hand" can operate at speeds up to 40 strokes per minute.

Further savings accrue because automatic unloading permits the transfer of operators to other jobs. The elimination of possible accidents due to manual handling of sharp-edged stampings also contributes to increased production by reducing man-hours lost.

Whether your press production involves large stampings, such as those produced by Nash, or very small parts, Sahlin can provide the right answer to your unloading problem. Five sizes of "Iron Hands" and eight types of gripping jaws are available. You'll find complete information in the current, fully-illustrated "Iron Hand" catalog. Write for a copy today.

**Unloads stampings as small as this bracket.**



Besides eliminating a hazardous unloading operation at Deluxe Stamping Company, Hazel Park, Michigan, the "Iron Hand" increased production 25%—to 1000 stampings per hour.

# sahlin

engineering company

267 Ferndale Street • Birmingham, Michigan

Representatives in: Buffalo • Indianapolis  
Pittsburgh • Cleveland • Dayton • San Francisco  
London • Paris • Milan

(Continued from page 130)

### — B —

Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

Hydraulic turbines—\$370,952 (50)

K. W. Battery Co., Skokie, Ill.

Military type batteries — \$323,230 (25)

Beech Aircraft Corp., Sedgwick County, Kans.

Aircraft parts—\$20,521 (65)

Beech Aircraft Corp., Wichita, Kans.

Aircraft & parts—\$48,399 (45)

Be-Ge Manufacturing Co., Santa Clara, Calif.

Ordnance—\$250,000 (70)

Bell Aircraft Corp., Fort Worth, Tex.

Military helicopters—\$91,982 (65)

Bendix Aviation Corp., Bendix Radio Div., Towson, Md.

Electronic equipment—\$28,189 (65)

Bendix Aviation Corp., Burbank, Calif.

Aircraft parts—\$48,200 (60)

Bendix Aviation Corp., Pioneer-Central Division, Davenport, Iowa

Aircraft parts—\$43,264 (60)

Bendix Aviation Corp., Scintilla Magneto Div., Sidney, N. Y.

Aircraft parts—\$18,259 (65)

Bendix Aviation Corp., South Bend, Ind.

Aircraft parts—\$128,134 (55)

Bendix Aviation Corp., Elmira, N. Y.

Ordnance—\$42,614 (65)

Bendix Aviation Corp., Teterboro, N. J.

Aircraft parts—\$29,300 (40)

Bendix Aviation Corp., Hamilton, Ohio

Aircraft parts—\$37,589 (60)

J. N. Booth Co., Inc., Cleveland, Ohio

Ordnance—\$8,721 (70)

Borg-Warner Corp., Chicago, Ill.

Aircraft parts—\$450,000 (40)

Bowen Products Corp., Auburn, N. Y.

Ordnance—\$37,200 (70)

The Brown Corp., Syracuse, N. Y.

Ordnance—\$3,545 (70)

The Brunswick-Balke-Collender Co., Marion, Smyth Co., Va.

Aircraft parts—\$73,672 (70)

Buchmann Spark-Wheel Corp., Long Island City, N. Y.

Ordnance—\$70,000 (50)

The Budd Co., Detroit, Mich.

Ordnance—\$31,563 (65)

Ordnance—\$195,782 (65)

### — C —

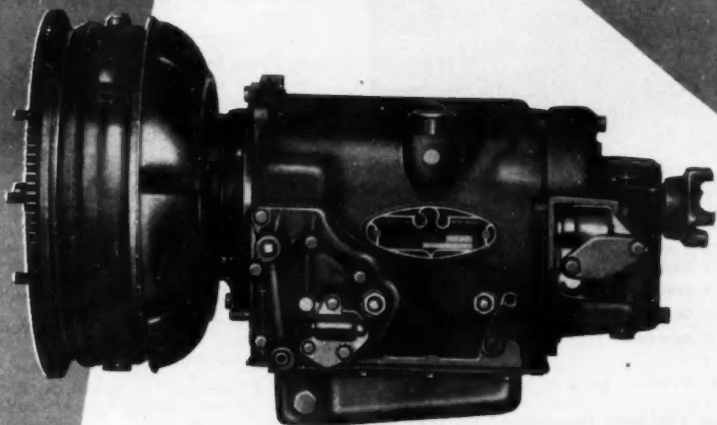
Casco Products Corp., Bridgeport, Conn.

Ordnance—\$17,950 (65)

(Turn to page 136, please)

ENGINEERED FOR...

EXTRA DEPENDABILITY!



**AUTOMATIC  
TRANSMISSION**

*by Detroit Gear*

- Fullest utilization of engine power for fast pickup from standing start
- Smooth operation in all speed ranges
- Rocking ability of car if stalled in snow or mud
- No creeping . . . no need to keep foot on the brake
- Solid direct drive in high for maximum efficiency

For over 40 years Detroit Gear  
has been a leader in the production  
of highest quality gearing for automotive,  
agricultural and aircraft industries.

For further information write,  
wire or phone.

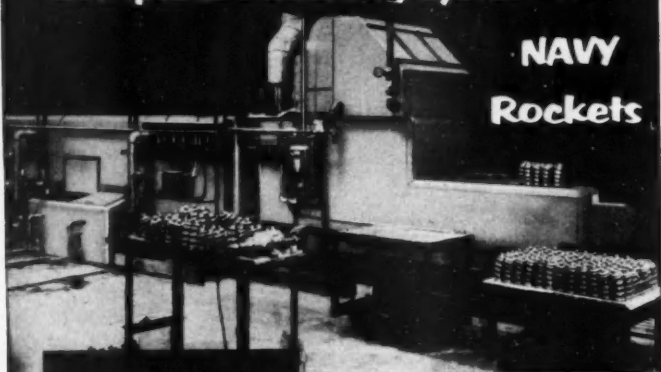


*Detroit Gear*

DIVISION OF SAE-S-WARREN  
DETROIT 14, MICHIGAN

## Complete Finishing System for

## NAVY Rockets



Cleaning and Bonderizing Machine

Engineered by  
**Cincinnati**  
CLEANING and  
FINISHING  
MACHINERY  
COMPANY

at the  
**U.S. NAVAL  
INDUSTRIAL  
RESERVE ORDNANCE  
PLANT**  
operated by  
**UNITED STATES  
HOFFMAN  
MACHINERY  
CORPORATION**  
Poughkeepsie, N.Y.

### EIGHT OPERATIONS

- |                  |                          |
|------------------|--------------------------|
| 1. Wash          | 2. Rinse                 |
| 3. Bonderite     | 4. Cold Rinse            |
| 5. Chromic Rinse | 6. Hot Air (Fan) Blowoff |
| 7. Paint Cavity  | 8. Prime Paint Outside   |

CINCINNATI engineered, this complete finishing system for Navy Rockets includes a two booth point finishing system, a Bonderizing machine and belt and monorail conveyors.

In order to successfully clean these hollow units, CINCINNATI Engineers provided an inclined conveyor belt through the washing and Bonderizing machine. This assures complete cleaning, draining and drying of the parts. A separate spray booth with a time-saving inside spraying mechanism was also installed.

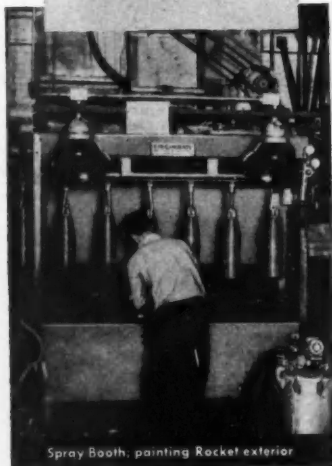
With a minimum of adaption this CINCINNATI installation could handle a great variety of parts. Other representative installations have shown savings of up to 75% in time and cost.

Write for your copy of the latest CINCINNATI Catalog today.

## Cincinnati

CLEANING & FINISHING  
MACHINERY COMPANY

315 Hecla Street  
Ironton, Ohio



Spray Booth, painting Rocket exterior

(Continued from page 134)

Century Engineering Corp., Cedar Rapids, Iowa  
Aircraft parts—\$37,034 (65)

Clark Bros., Co., Inc., Olean, N. Y.  
Engines, compressors & parts—\$1,339,710 (50)

The Cleveland Pneumatic Tool Co., Cleveland, Ohio  
Aircraft parts—\$31,958 (60)

Connecticut Metal Treating Co., Inc., Bridgeport, Conn.  
Aircraft parts—\$30,000 (45)

Continental Can Co., Inc., Coffeyville, Kans.  
Aircraft parts—\$48,007 (65)

Continental Can Co., Inc., Milwaukee, Wis.  
Aircraft parts—\$192,412 (65)

Continental Motors Corp., Muskegon, Mich.  
Ordnance—\$793,657 (60)

Cook Research Laboratory, Menlo Park, Calif.  
Aircraft parts—\$74,353 (50)

Cooper Precision Products, Los Angeles, Calif.  
Aircraft parts—\$552,380 (70)

Curtis Laboratories, Inc., Los Angeles, Calif.  
Aircraft components—\$7,189 (65)

Curtiss-Wright Corp., Caldwell, N. J.  
Aircraft parts—\$229,673 (65)

### — D —

Dearborn Stove Co., Dallas, Tex.  
Ordnance—\$2,384 (70)

Detroit Harvester Co., Paris, Ky.  
Aircraft parts—\$278,990 (65)

Detroit Plastic Fixture Co., Detroit, Mich.  
Aircraft parts—\$4,569 (65)

Douglas Aircraft Co., Inc., El Segundo, Calif.  
Aircraft & spare parts—\$69,127 (60)

Draper Motors Corp., Centerline, Mich.  
Ordnance—\$114,012 (70)

Dynamic Air Engineering, Inc., Los Angeles, Calif.  
Aircraft parts—\$145,000 (45)

### — E —


Eastern Rotocraft Corp., Doylestown Township, Pa.  
Aircraft parts—\$89,550 (40)

Elbecco, Inc., Jackson, Mich.  
Aircraft parts—\$32,350 (70)

Electric Auto-Lite Co., Toledo, Ohio  
Ordnance—\$131,053 (75)  
Ordnance—\$26,959 (65)

The Electric Storage Battery Co., Philadelphia, Pa.  
Military type batteries—\$6,491,047 (40)

(Turn to page 138, please)



INCREASES  
DIE LIFE

FABRICATES  
READILY

SOLDERS  
EASILY

ELIMINATES  
PLATING

RESISTS  
RUST

## How to reduce your costs with Pre-Coated **Thomas Strip**

Here's a profit-building idea for any light metals fabricator—combine the functional properties of non-ferrous metals with the utility and economy of cold-rolled strip steel by using *pre-coated* Thomas Strip to speed operations and cut costs.

In many instances with Thomas Strip, all you have to do is fabricate and assemble—expensive surface preparation and plating operations are eliminated. It resists corrosion during processing and serves as the final inside and out finish—or as a base for further plating. Tinning, soldering and brazing operations are made easier with many of the coatings.

Thomas Strip fabricates readily—most of the coatings lubricate dies—stretch die life—give greater production per grind. Coating is unitized with the strip steel base of controlled metallurgy and proper ductility—adheres tightly even during severe forming, drawing and rolling operations.

In addition to the many cost-reducing advantages of making your products from pre-coated Thomas Strip, you improve their appearance—give them added luster and sales appeal. For assistance in selecting pre-coated strip for your operations, write today.

*Cold-rolled strip steel electrolytically pre-coated with Zinc, Copper, Brass, Nickel, Lead-Alloy and Chromium in Natural, Planished and Buffed Finishes—Hot Dip Tin and Lead Alloy Coated—Lacquer Coated in Colors—Annealed Spring Steel—Alloy Strip Steel—Uncoated Strip Steel, carefully produced to your specifications.*

**Thomas Strip**  
a product of  
**Pittsburgh Steel Company**  
Thomas Strip Division • Warren, Ohio

(Continued from page 136)

**Elliott Co., Jeanette, Pa.**  
Components for diesel engines—  
\$192,198 (50)

**Eton Machine Co., Inc., Farmingdale,  
N. J.**  
Aircraft parts—\$4,161 (70)

— F —

**Fairchild Engine & Airplane Corp.,  
Hagerstown, Md.**  
Airplanes & airplane parts—\$29,205  
(65)  
Airplanes & parts—\$458,792 (65)

**Fairchild Engine & Airplane Corp.,  
Bayshore, Suffolk County, N. Y.**  
Aircraft parts—\$213,148 (65)

**Fairchild Engine & Airplane Corp.,  
Farmingdale, L. I., N. Y.**  
Ordnance—\$19,530 (65)  
Aircraft parts—\$30,014 (65)

**Farm Tools, Inc., Cleveland, Ohio**  
Aircraft parts—\$15,814 (70)

**The Flour City Ornamental Com-  
pany, Minneapolis, Minn.**  
Aircraft parts—\$189,430 (65)

**Forrest Wagniere Engineering Co.,  
Culver City, Calif.**  
Aircraft parts—\$6,287 (70)

**France Packing Co., Philadelphia, Pa.**  
Piston rings & valves—\$24,610 (65)

**Fricano Custom Products Co., Ingle-  
wood City, Calif.**  
Aircraft parts—\$64,007 (50)

— G —

**General Electric Co., Burlington,  
Conn.**  
Aircraft parts—\$90,091 (65)

**General Electric Co., Worcester,  
Mass.**  
Aircraft parts—\$76,295 (65)

**General Fireproofing Co., Youngs-  
town, Ohio**  
Aircraft parts—\$325,000 (40)

**General Machinery Co., Spokane,  
Wash.**  
Ordnance—\$18,000 (70)

**General Metals Corp., Burbank,  
Calif.**  
Aircraft parts—\$25,231 (60)

**General Motors Corp., Anderson, Ind.**  
Ordnance—\$188,287 (65)

**General Motors Corp., Indianapolis,  
Ind.**  
Aircraft parts—\$130,318 (65)  
Aircraft parts—\$79,017 (65)

**General Motors Corp., Grand Rapids,  
Mich.**  
Aircraft parts—\$146,000 (45)

**General Motors Corp., Rochester,  
N. Y.**  
Aircraft parts—\$145,808 (65)

**General Motors Corp., Vandalia, Ohio**  
Aircraft parts—\$66,884 (60)

**Globe Corp., Lockport Township, Ill.**  
Ordnance—\$19,543 (45)

**Goodyear Tire & Rubber Co. of Ala.,  
Gadsen, Ala.**  
Pontoon—\$47,692 (45)

— H —

**Hackney Bros. Body Co., Wilson,  
N. C.**  
Ordnance—\$190,620 (45)

**B. H. Hadley Co., Pomona, Calif.**  
Aircraft parts—\$25,566 (70)

**Haley Machine Co., Inc., Springfield,  
Ohio**  
Ordnance—\$43,595 (70)

**Harford Mfg., Inc., Culver City,  
Calif.**  
Aircraft parts—\$50,912 (70)

**Edward A. Heiner Labs., Farming-  
dale, N. Y.**  
Aircraft products—\$11,643 (70)

(Turn to page 141, please)

# Test Cabinet

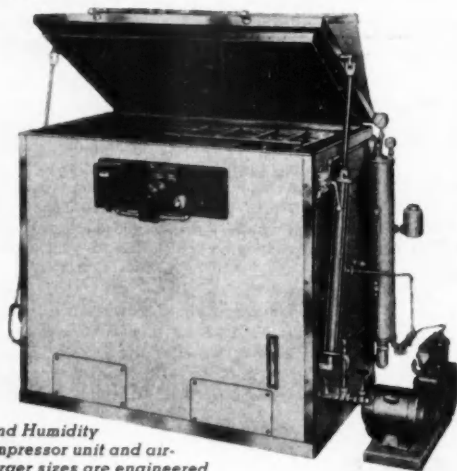
## for SALT FOG CORROSION TESTS or HUMIDITY CORROSION TESTS

**for Salt Fog Tests** Meets the latest specifications  
of government and military authorities.

**for Humidity Tests** 95% to 100% relative  
humidity at room temperature to 125° F., temperature  
thermostatically controlled.

### features

- Lucite nozzle
- Built-in heaters
- Fully insulated
- Exhaust flange  
at rear
- Air-operated  
cover lifter (extra)



Standard size No. 1  
**INDUSTRIAL Salt Fog and Humidity  
Test Cabinet** with air-compressor unit and air-  
operated cover lifter. Larger sizes are engineered  
to your requirements.

Write for complete information  
and recommendations

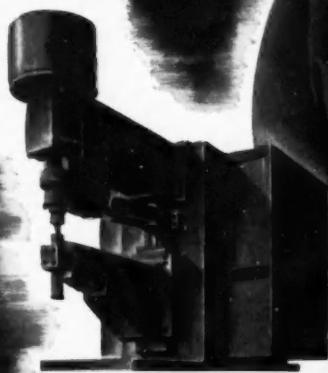
## INDUSTRIAL FILTER & PUMP MFG. CO.

5920 Ogden Avenue  
Chicago 50, Illinois

FILTERS		PUMPS	CORROSION TESTING APPARATUS	
Pressure Type		Centrifugal	Salt Fog • Humidity	
RUBBER DIVISION		WATER		
Vulcanized Linings • Molded Products		DEMINERALIZERS		



UNIVERSALLY ACCEPTED



the largest

resistance welding

machine manufacturers

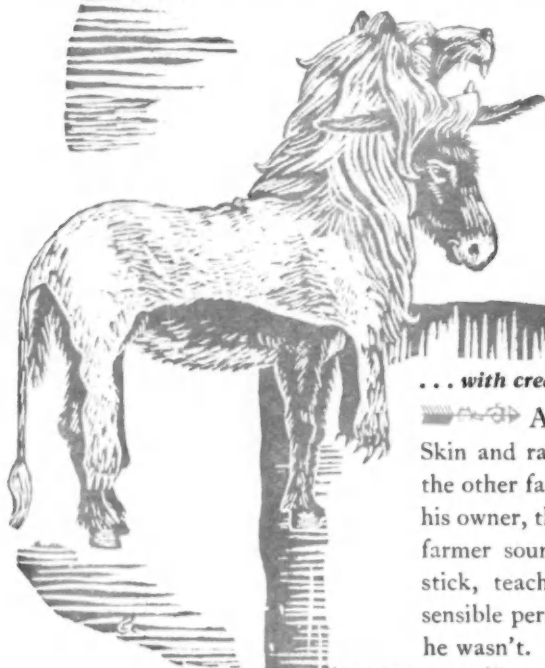
in the world

**SEIAKY**

14915 West 67th Street  
CHICAGO

Plants at London, Paris

# "The Ass in the Lion's Skin"



## is a story for Cutting Fluid users

... with credit to Aesop, the Fable-Maker

An Ass dressed himself up in a Lion's Skin and ran about scaring the daylights out of the other farm animals. Then he tried to frighten his owner, the farmer. That was his downfall. The farmer soundly beat the stupid ass with a big stick, teaching him that he couldn't fool any sensible person by parading around as something he wasn't.

### **The Moral:**

Different types of cutting fluids have their respective places in machining. Dressing a coolant up in a "Lion's Skin" doesn't change its capabilities. For example, if you have a difficult broaching job on a soft, tough steel *more than a "coolant" is needed*. You need the high anti-weld properties, the high lubricity and the superior temperature regulating qualities of a

product like Stuart's ThredKut 99.

Stuart offers you a combination of time-tested products and wide experience in their application. You gain from this fewer rejects, longer tool life and greater production—often with *fewer* different cutting fluids in your plant. Ask to have a Stuart Representative demonstrate how he can save you time, money and material.

**More Than a "Coolant" is Needed**

**D.A. Stuart Oil Co.**  
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS  
2727 S. Troy St., Chicago 23, Ill.

SEND FOR BOOKLET entitled *More Than a "Coolant" is Needed*

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

to D. A. Stuart Oil Co., Ltd., 2727 S. Troy St., Chicago 23, Ill.

Your Name .....

Title .....

(Continued from page 138)

The Heppenstall Co., Bridgeport, Conn.

Aircraft parts—\$144,402 (60)

Hetherington, Inc., Sharon Hill, Pa.  
Aircraft parts—\$15,500 (45)

Hobart Brothers Co., Troy, Ohio  
Power plants for military use—\$310,000 (40)

Hollow Boring Corp., Worcester, Mass.  
Ordinance—\$4,425 (70)

Holly Mfg. Co., Pasadena, Calif.  
Aircraft parts—\$44,435 (70)

Hydro-Aire, Inc., Burbank, Calif.  
Aircraft parts—\$43,750 (45)

Hyster Co., Portland, Oreg.  
Parts for earth-moving equipment—\$12,129 (50)

— I —

Island Machine Co., Inc., Farmingdale, N. Y.  
Aircraft parts—\$12,543 (70)

— J —

Jack & Heintz, Inc., Maple Heights, Ohio  
Aircraft parts—\$27,000 (45)

Jacobs Aircraft Engine Co., Pottstown, Pa.  
Aircraft parts—\$40,000 (45)

Jonco Aircraft Corp., Shawnee, Okla.  
Aircraft assemblies—\$206,075 (65)

Earle M. Jorgensen Co., Los Angeles County, Calif.  
Aircraft forgings—\$277,236 (60)

— K —

Kasco Machine & Engineering Inc., Los Angeles, Calif.  
Aircraft parts—\$8,760 (70)

Kearfott Mfg. Corp., Newark, N. J.  
Aircraft parts—\$1,507 (70)

Kelsey-Hayes Wheel Co., Detroit, Mich.  
Aircraft parts—\$160,366 (40)

King-Seeley Corp., Dexter, Mich.  
Ordinance—\$400,000 (40)

Korry Mfg. Co., Inc., Seattle, Wash.  
Aircraft parts—\$102,838 (50)

Kropp Forge Co., Chicago, Ill.  
Forgings for aircraft—\$165,999 (65)

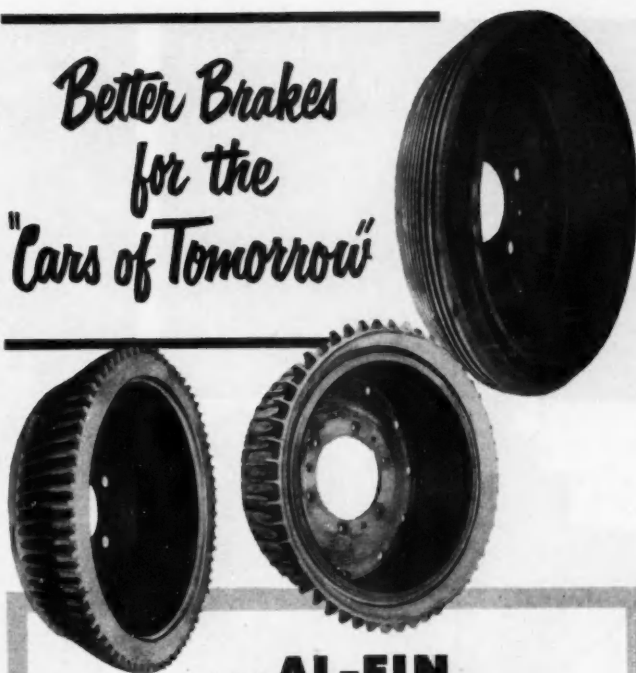
— L —

R. A. Lalli Co., Stratford, Conn.  
Aircraft parts—\$55,700 (55)

Lamson & Sessions Co., Chicago, Ill.  
Aircraft parts—\$158,913 (65)

(Turn to page 144, please)

## Better Brakes for the "Cars of Tomorrow"



### ...AL-FIN BI-METALLIC DRUMS

While American Manufacturers are testing their "cars of tomorrow," the "brakes of tomorrow" are already here. Al-Fin drums have proved themselves in the most spectacular of all tests—the great international road races of Europe and America!

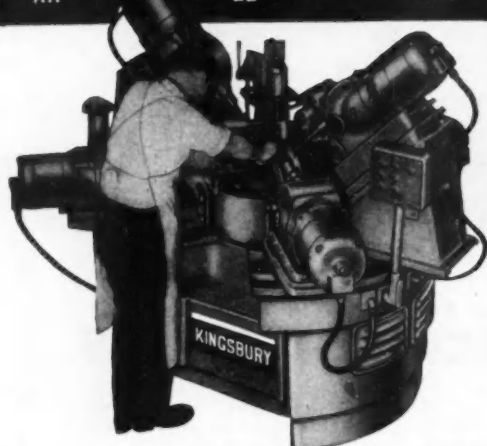
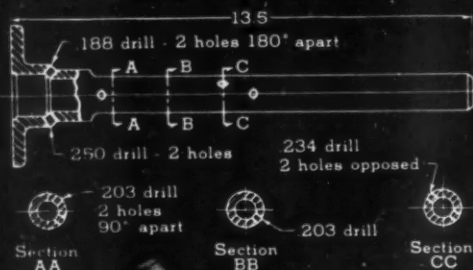
Last year, cars equipped with Al-Fin brake drums took 83 first, 48 second and 38 third places in races that ranged from the grueling 24-hour grind at Le Mans (France) to the mountainous Rallye des Alpes. This year, six out of the first ten cars at Le Mans, including the first four, were Al-Fin equipped. After the race, Daimler-Benz, makers of the winning and second place cars, pronounced the Al-Fin brake drums "still in flawless condition."

Already standard equipment on certain foreign makes of cars, Al-Fin bi-metallic brake drums are the solution to the severe braking problems posed by increased speeds and horsepower combined with torque converter transmissions on American cars.

Al-Fin is the patented molecular bonding process used to bond a cast iron friction surface to an aluminum housing that carries the torque and dissipates heat. Write for the new Al-Fin Technical Booklet illustrating brakes and other bonded bi-metallic products: pistons, sleeve bearings and bushings, timing gears, engine housings, etc.

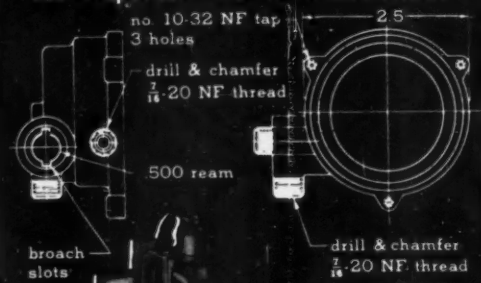
**AL-FIN**  
DIVISION OF  
ENGINE AND AIRPLANE CORPORATION  
**FAIRCHILD**  
FARMINGDALE, L.I., N.Y.

## Shaft 3.0¢ per part for 9 operations from 6 directions



**155 PARTS AN HOUR GROSS.** This non-index machine has one fixture in the center that holds the shaft with its axis vertical. Four horizontal and two angular units drill all nine holes at the same time. Clamping and unclamping are automatic.

## Choke housing 1.1¢ per part for 9 operations from 3 directions



**305 PARTS AN HOUR GROSS.** On this 20-inch "Auto Index" horizontal units work on two faces. Two units are 45° left of radial lines through the fixtures; three units and an air cylinder for the broach are 45° right. A vertical unit taps three holes.

# One Kingsbury replaces

**Special-purpose high-production machines use automatic units to perform thousands of operations per man-hour**

Dear Sir:

How many operations do these four Kingsburys do in an hour? If you multiply the number of operations per part by the production at 80% efficiency you get —

Shaft	1116
Choke Housing	2196
Transmission part	5856
Throttle Body	4800

Compare the number of operations that standard machines do in an hour with these Kingsbury figures. That gives you an idea how many standard machines one Kingsbury can replace.

### Several machines in one

Each machine has several automatic drilling and tapping units ( $\frac{1}{2}$  to 5 hp) that operate at the same time. Each unit does the operations that one standard machine would do.

On the machine for the Shaft all units operate on the same part at the same time. The other three machines have index tables with a number of duplicate work fixtures. The units operate at different stations. The table indexes to present each part in turn to each station.

### All this in 7.4 seconds

For example, the Throttle Body machine does all this in 7.4 seconds:

In front the part is unclamped. The man removes it and replaces it with another part. (The right view is the plan view in the fixture.)

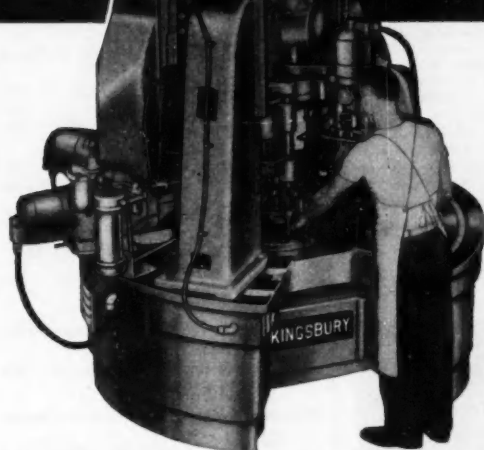
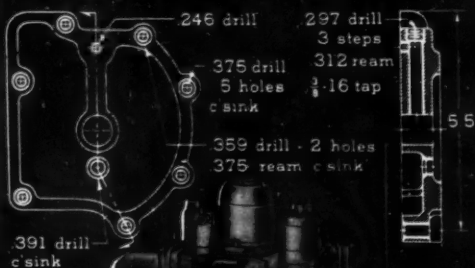
At station 1 on his left a milling unit mills the face of another part.

At station 2 a vertical unit counterbores another part 1.518.

At station 3 a horizontal unit drills for the tapped hole. A 4-spindle vertical unit drills three holes at station 3 and spot drills at station 4 because the center distances are so close.

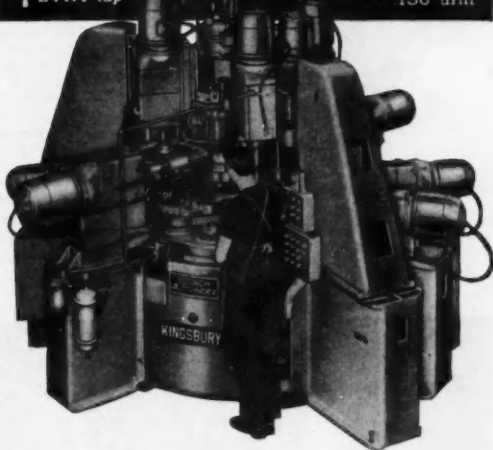
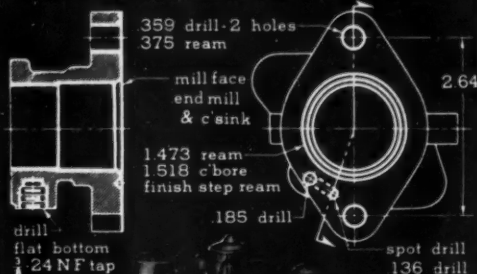
At station 6 in the rear an angular unit drills the .136 hole.

## Transmission part 2¢ per part for 24 operations from 2 directions



305 PARTS AN HOUR GROSS. A 20-inch power index table has eight fixtures. Three horizontal units drill .297 in steps for a short time cycle. Two others ream and tap. Four vertical units with multi-spindle heads do the nine holes in the left view.

## Throttle body 3¢ per part for 15 operations from 3 directions



400 PARTS AN HOUR GROSS. Here is a 60-inch automatic indexing machine, the largest size we build (and ever hope to). It has one angular and four horizontal units on knees that are bolted to the base and six vertical units on the central column.

# many standard machines

At station 7 a vertical unit reams the throttle bore 1.473.

At station 9 a vertical unit finish step reams the throttle bore and a horizontal unit flats the bottom of the tapped hole.

At station 10 a 2-spindle vertical unit reams two holes .375 and a horizontal unit taps  $\frac{3}{16}$ -24.

At station 11 on his right a vertical unit with a combination tool end mills the face to remove tool marks and countersinks the throttle bore.

All that takes 7.4 seconds. Indexing takes 1.6 seconds. So the total time cycle is (theoretically) 9.0 seconds. That means a gross production of 400 parts an hour (3600 secs. ÷ 9 secs.).

This machine has no units at stations 5 and 8, so our customer can add operations if the product should change. On any Kingsburys you can relocate units and change speeds and feeds. Compared to general purpose machines they are not too flexible.

But their output is just terrific.

Sincerely,  
Kingsbury Machine Tool Corp.  
96 Laurel Street, Keene, N. H.

## KINGSBURY

### Each unit cost on the drawings

includes the cost of the man and of the machine - no power or overhead. We assumed:

Unit cost of the man equal to:  
average U.S. hourly wage  
hourly gross × 80% efficiency

Unit cost of the machine to be:  
price of tooled machine  
output in 6000 hrs. @ 80% eff.

**AUTOMATIC DRILLING  
& TAPPING MACHINES**  
for Low-Cost High Production



# NOW, DUMORE DRILL HEAD

## makes every drill operator an expert!



Holes for airplane parts are produced 12 times faster at a 97% cost reduction with this setup. In fact, the Dumore Drill Head paid for itself after only 4½ hours operation.

**THE DUMORE COMPANY**  
1309 Seventeenth Street • Racine, Wisconsin

(Continued from page 141)

The Lamson & Sessions Co., Cleveland, Ohio

Aircraft parts—\$197,531 (65)

The Lamson & Sessions Co., Kent, Ohio

Aircraft parts—\$122,725 (65)

Langdon Mfg. Co., Glendale, Calif.

Aircraft parts—\$5,535 (45)

Le Roi Co., Milwaukee, Wis.

Pumping machinery—\$419,528 (50)

The Lee Co., Hartford, Conn.

Aircraft parts—\$3,723 (70)

Littleford Bros., Inc., Cincinnati, Ohio

Earthmoving equipment — \$35,724 (60)

Earthmoving equipment — \$27,000 (60)

Lockheed Aircraft Corp., Burbank, Calif.

Aircraft & spare parts—\$33,468 (65)

Aircraft & spare parts—\$7,160 (40)

Aircraft & spare parts—\$62,787 (40)

Airplanes & parts—\$38,728 (40)

Aircraft & spare parts—\$5,935 (40)

Aircraft & spare parts—\$31,792 (40)

Lockheed Aircraft Corp., Los Angeles, Calif.

Airplanes & parts—\$140,250 (40)

### — M —

McLean Development Laboratories, Inc., Dallas, Tex.

Research & development for aircraft —\$10,639 (70)

The M. B. Mfg. Co., Inc., New Haven, Conn.

Aircraft parts—\$132,989 (60)

Mack Engineering Co., Minneapolis, Minn.

Aircraft parts—\$17,276 (45)

Magna Mill Products, South Gate, Calif.

Aircraft parts—\$145,285 (65)

Mainstique Tool & Mfg. Co., Manistique, Mich.

Aircraft parts—\$19,906 (70)

The Majestic Co., Inc., Huntington, Ind.

Ordnance—\$85,000 (40)

Manlove Manufacturing Co., Los Angeles, Calif.

Aircraft parts—\$11,720 (70)

Marman Products Co., Inc., Los Angeles, Calif.

Aircraft parts—\$655,792 (50)

The Glenn L. Martin Co., Baltimore, Md.

Aircraft parts—\$17,930 (65)

Meckum Engineering, Inc., Ottawa, Ill.

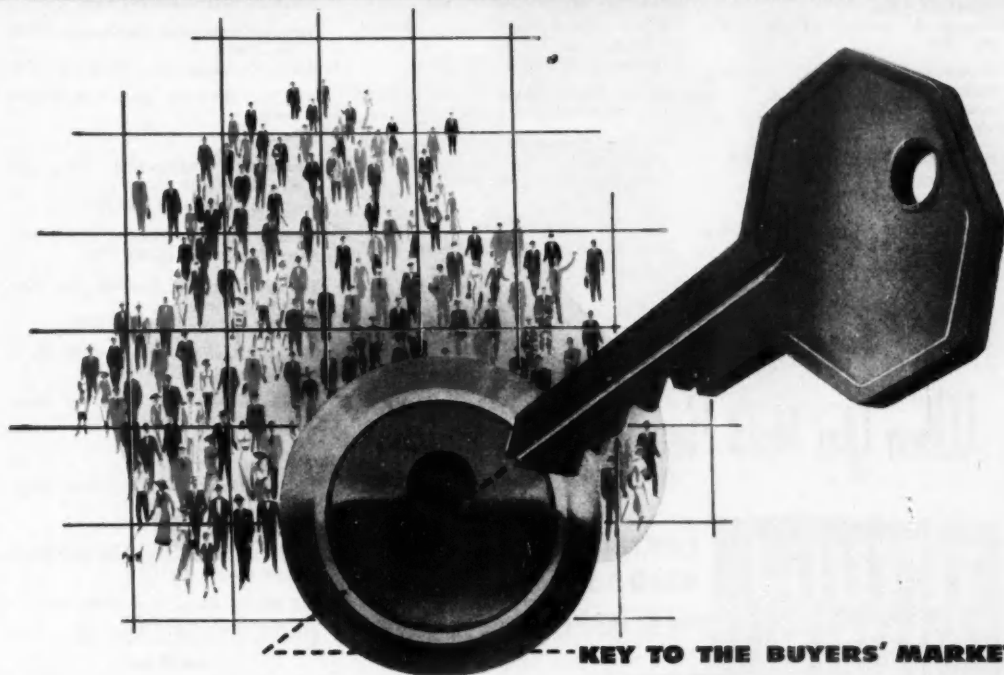
Ordnance—\$4,460 (40)

Metal Specialties Mfg. Co., Melrose Park, Ill.

Ordnance—\$340,000 (30)

(Turn to page 146, please)

## EQUIPMENT UNITS THAT BESPEAK QUALITY



KEY TO THE BUYERS' MARKET

When demand begins to sag and competition grows keen, value becomes the key to the buyers' market.

Automotive value is a complex thing, made up of design, quality, performance and many other factors.

AC is one of the world's largest equipment manufacturers, specializing on 22 lines of equipment units of unusual merit, skillfully designed and precisely built. They add extra value that helps your salesmen sell, and helps keep your customers satisfied.

ADAPTERS (Drive)  
AIR CLEANERS AIR  
CLEANERS AND SILENC-  
ERS (Combination) AM-  
METERS BREATHERS  
(Crankcase) CAPS (Radi-  
ator Pressure) FLEXIBLE  
SHAFT ASSEMBLIES FUEL  
PUMPS FUEL AND VACUUM  
PUMPS (Combination) FUEL  
FILTERS & STRAINERS GASOLINE  
STRAINERS GAUGES—AIR  
(Pressure) GAUGES—GASOLINE  
GAUGES—OIL (Pressure) GAUGES  
—TEMPERATURE (Water, Oil) OIL  
FILTERS (Lube) PANELS (Instru-  
ment, SPARK PLUGS SPEEDOMETERS  
TACHOMETERS TERMINALS (Ignition  
Wire) VALVES (Crankcase Ventilation)

# AC

## QUALITY PRODUCTS

1300 North Dort Hy.  
Flint 2, Michigan

General Motors Bldg.  
Detroit 2, Michigan

Lincoln Tower Bldg.  
Chicago 1, Illinois

AC SPARK PLUG DIVISION



GENERAL MOTORS CORPORATION

(Continued from page 144)

**Metallic Friction Material Company,**  
Cleveland, Ohio  
Ordinance & aircraft items—\$156,-  
940 (60)

**Michigan Steel Casting Co., Detroit,**  
Mich.  
Aircraft parts—\$2,151 (65)  
Aircraft parts—\$5,834 (70)

**Miller Industries, Jackson, Mich.**  
Aircraft parts—\$47,564 (70)  
Aircraft parts—\$14,590 (65)

**Monogram Mfg. Co., Culver City,**  
Calif.  
Aircraft parts—\$296,215 (55)

**Monument Engineering Co., Inc.,**  
Indianapolis, Ind.  
Aircraft parts—\$42,800 (45)

**Motor Specialties Corp., Detroit,**  
Mich.  
Ordinance—\$192,475 (70)

**Motor Wheel Corp., Lansing, Mich.**  
Ordinance—\$89,072 (60)

**Mullins Manufacturing Corp., War-**  
ren, Ohio  
Ordinance—\$1,000,000 (70)

— N —

**Narmco Mfg. Co., San Diego, Calif.**  
Aircraft parts—\$39,894 (65)

**National Die Casting Co., Chicago,**  
Ill.  
Aircraft parts—\$15,981 (45)

**Nemec Combustion Engineers, Whit-**  
tier, Calif.  
Aircraft components—\$174,906 (45)

**Neo Ray Products, Inc., Des Moines,**  
Iowa  
Aircraft parts—\$36,018 (70)

**Neuschotz Engineering Co., Los**  
Angeles, Calif.  
Aircraft parts—\$11,305 (70)

**Nevada Air Products Co., Reno, Nev.**  
Aircraft parts—\$16,545 (70)

**The New Britain Machine Co., New**  
Britain, Conn.  
Aircraft parts—\$268,258 (55)

**Newark Machine Co., Newark, N. J.**  
Aircraft parts—\$23,479 (70)

**W. H. Nichols Co., Waltham, Mass.**  
Aircraft parts—\$22,912 (65)

— O —

**O & M Machine Co., Inc., Los An-**  
geles, Calif.  
Aircraft parts—\$55,207 (65)

**The Oliver Corp., Battle Creek, Mich.**  
Ordinance—\$60,012 (60)

**The Oliver Corp., Cleveland, Ohio**  
Ordinance—\$82,866 (65)

— P —

**Pastushin Aviation Corp., Los An-**  
geles, Calif.  
Aircraft parts—\$35,000 (45)

**J. C. Peacock Machine Co., Los An-**  
geles, Calif.  
Aircraft parts—\$299,434 (70)

**Peerless Tool & Engineering Co., Chi-**  
cago, Ill.  
Aircraft parts—\$181,594 (60)

**Penberthy Injector Co., Detroit, Mich.**  
Ordinance—\$165,195 (65)

**Perfection Stove Co., Cleveland, Ohio**  
Aircraft parts—\$25,098 (70)

**Pinten Products Co., Royal Oak,**  
Mich.  
Ordinance parts—\$198,599 (50)

**Precision Methods & Machines, Inc.,**  
Waterbury, Conn.  
Aircraft parts—\$133,681 (55)

**Price-Plaster Brass Mfg. Co., Los**  
Angeles, Calif.  
Ordinance—\$27,000 (45)

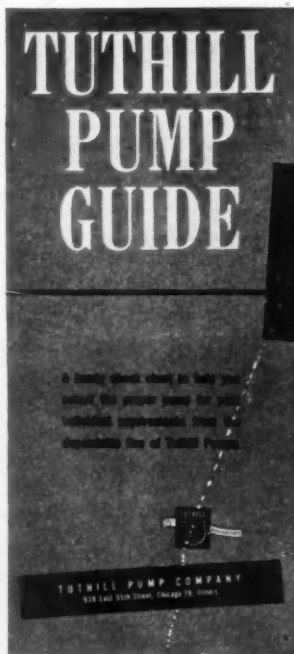
— R —

**Republic Aviation Corp., Long Island,**  
N. Y.  
Aircraft parts—\$189,870 (45)  
Aircraft & spare parts—\$85,685 (40)

**Revere Copper & Brass, Inc., Chicago,**  
Ill.  
Ordinance—\$35,000 (65)

(Turn to page 151, please)

## When You Need Pump Replacements...



Let this TUTHILL PUMP  
GUIDE Save You Time  
and Trouble.....

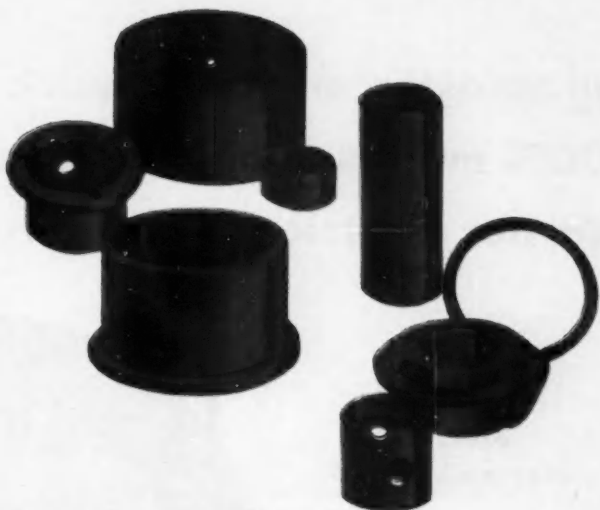
There's a Tuthill positive displacement  
internal-gear rotary pump to meet your  
needs in lubrication, hydraulic, cool-  
ant, and liquid transfer service.

To help you select the right pump for  
your replacements, Tuthill offers this  
handy, letterhead-size reference chart. It  
shows the Tuthill pumps available for  
each type of service, complete with  
capacities, pressures, speeds, packing,  
mounting and exclusive performance  
features. It makes the job of picking the  
right pump easier than ever before. It  
saves you time, work and trouble.

Write for your Tuthill Pump Guide today!



**TUTHILL PUMP COMPANY**  
939 East 95th Street, Chicago 19, Illinois



**Rolled bronze bushings, cast bronze bushings  
and precision bronze parts, produced in hundreds  
of designs, to many alloy specifications and in a great range of sizes.**

**Use our specialized facilities—capacity now available.**



# **FEDERAL-MOGUL**

**FEDERAL-MOGUL CORPORATION, 11037 SHOEMAKER, DETROIT 13, MICHIGAN**



**SINCE 1899**



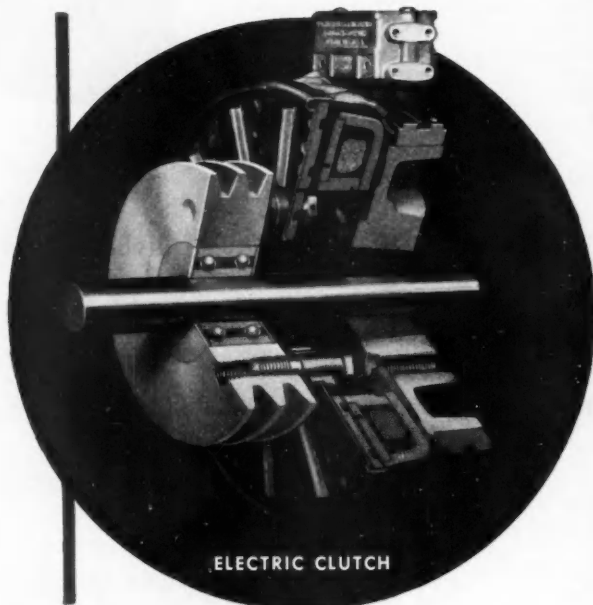
# **Burgmaster machine "quick on its feet"**

## **100% more saleable, with new Warner Electric Clutch features**

### **WARNER** **electric** **motion control**



- speeds operation 20%
- simplifies assembly and installation
- eliminates maintenance and repairs
- protects equipment and reduces machine wear
- smooths operation and eliminates noise
- improves saleability 100%



**ELECTRIC CLUTCH**

FAST speed changes are "duck soup" on this rapid-fire Burgmaster drilling and tapping machine. The operator merely turns a 4-position control knob—one knob for each spindle—to quickly select the right speed for the job. Warner Clutches engage the high or low speed pulleys *electrically*. With the two-speed, electric clutch drive, two-speed motor, and three sets of gear ratios, 12 spindle speeds are immediately available without a second of waste time for shifting belts or changing gears!

Consider some of the important design advantages "chalked up" on this application by the new Warner

Electric Clutches. Operation of the clutch drive is now 20% faster. No servicing or wear adjustments are required. An overload feature reduces machine wear—protects it from possible damage. Operation is smoother and quieter. Ease of assembly cuts manufacturing costs. And—most important—*saleability of the product is increased 100%!*

Improve customer acceptance of your machine—improve its clutching, braking, speed control, tensioning, or indexing efficiency — easily and simply with the amazing new automatic features of Warner *electric motion control*. Write for details!

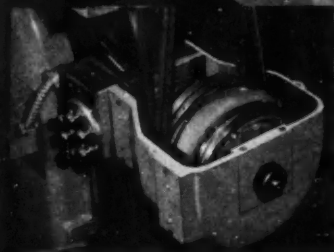


## **ELECTRIC BRAKES & CLUTCHES**

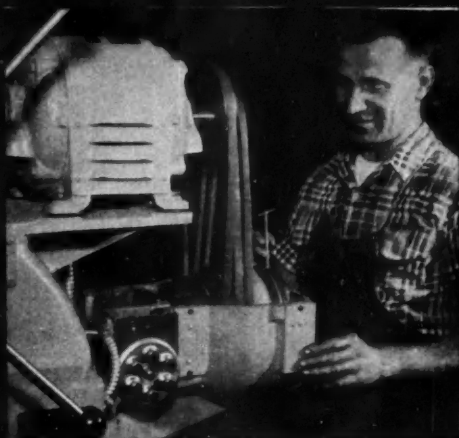
**FOR INDUSTRIAL APPLICATIONS**



EQUIPPED WITH WARNER  
electric  
motion control



Control drum actuates micro switches, operating Warner Electric Clutches mounted to high and low speed pulleys.



Compact Warner units are easily and quickly mounted to universal drive shaft in transmission box, reducing assembly costs.

The No. 2 Model A Burgmaster, manufactured by Burg Tool Manufacturing Co., Los Angeles, is a universal machine for drilling, tapping and reaming in all metals. Its six-station turret head is automatically power indexed by a Geneva mechanism and take-off from the main drive shaft through an overload clutch shaft. Individual speeds of spindles are pre-selected for particular operations. Wide variety of jobs is easily performed, with minimum work handling and operator fatigue.

Warner Electric Brakes, Clutches and Clutch-Brakes give you new, unique simplicity of design and operation. There are only two main parts, an armature and magnet. Operation is by *electro-magnetic*, instantaneous engagement and release of friction surfaces. Torque ratings are extremely high for small size and light weight. No coasting or slipping when "locked in." Easily designed into original equipment. Readily adapted to automatic cycles and remote control by limit switches, relays, electric-eyes, pushbuttons, etc.

Rate of application accurately controlled to synchronize motions—give exact degree of speed and power required.

**COMPLETE ENGINEERING SERVICE**... Warner offers complete application and design engineering service and field assistance. If you have a clutching, braking, tensioning, indexing or speed control problem, consult competent, experienced Warner brake and clutch specialists for reliable recommendations on torque, heat, electrical controls, capacity, etc.



Warner Electric Brake & Clutch Co., Dept. A1,  
Beloit, Wis.

OUR 25th YEAR

- ☐ Please send your FREE Bulletin No. 703-A  
☐ Have your representative call to discuss my problem.

Firm Name \_\_\_\_\_  
Individual \_\_\_\_\_ Title \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

THE SEAL OF  
COOPERATIVE  
RESEARCH



In cooperation with **DEERE & COMPANY**

**The JOHN DEERE SURFLEX TILLER  
WORKS UP TO 130 ACRES A DAY.  
DEPENDABLE UNDER ALL CONDITIONS**

This John Deere 20-foot Surfex Disk Tiller is a remarkable farm machine. It tills up to 130 acres a day. Over hilly, uneven fields or on flat land, its penetration is uniform . . . exacting the maximum from every acre in every field condition.

Surflex dependability grows from Deere & Company's exhaustive care in the design, development and manufacture of each part of the unit. Each of the disk bearings, for example, is protected by a C/R Type "V" diaphragm oil seal with a leather sealing surface. Obviously, these seals must exclude every trace of the ever-present dirt in which the tiller operates.

As is the case with all C/R "Perfect" oil seals, those for the John Deere Surfex Disk Tiller were developed in cooperation with the manufacturer's engineers.

Each C/R seal is designed to do a specific job of protecting bearings under a variety of tough operating conditions. And, each C/R seal does that job as well as it can be done.

That's why, when you have a problem of lubricant retention, or foreign matter exclusion, it will pay you to check with C/R engineers first.

P. S. For immediate delivery, C/R "Perfect" oil seals are stocked in over 1800 sizes covering 15 different types.

The cooperative research and engineering services which C/R has provided in producing special C/R oil seals (both synthetic rubber and leather) for leading manufacturers are available to you. We will be pleased to send you any information you wish. Brochure on request.

**C/R**

**Oil Seals**

**SIRVIS**

**Mechanical Leather Products**

Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.



**SIRVENE**

**The Scientifically  
Compounded Elastomer**

Custom-engineered and custom-built for critical service in aircraft, automotive and other mechanisms.



**Representatives in these Principal Cities**

Boston • New York • Syracuse  
Philadelphia • Pittsburgh • Cincinnati  
Cleveland • Detroit • Peoria  
Minneapolis • Kansas City • Houston  
Los Angeles • San Francisco

(Continued from page 146)

Reynolds Metals Co., Louisville, Ky.  
 Ordnance—\$10,370 (65)

Rivco, Inc., Downey, Calif.  
 Aircraft parts—\$156,278 (70)

The Ryan Aeronautical Co., San Diego, Calif.  
 Aircraft parts—\$5,978 (70)

# — S —

Sanitary Scale Co., Belvidere, Ill.  
 Aircraft parts—\$11,900 (65)

Schiller - Pfeiffer Machine Works,  
 Philadelphia, Pa.  
 Ordnance—\$87,764 (55)

Scott & Williams, Inc., Laconia &  
 Lakeport, N. H.  
 Aircraft parts—\$115,595 (65)

Shakespeare Co., Kalamazoo, Mich.  
 Aircraft instruments—\$24,506 (70)

Sier-Bath Gear & Pump Co., Inc.,  
 South Hackensack, N. J.  
 Aircraft parts—\$925,000 (30)

Solar Aircraft Co., San Diego, Calif.  
 Components for aircraft—\$88,515  
 (60)

Solar Aircraft Co., Des Moines, Iowa  
 Aircraft components—\$20,253 (70)  
 Aircraft parts—\$1,449 (70)

Standard Forge Co., Detroit, Mich.  
 Ordnance—\$40,000 (50)

Standard-Thompson Corp., Boston,  
 Mass.  
 Aircraft parts—\$91,361 (65)

Stanley Aviation Corp., Buffalo, N. Y.  
 Aircraft components—\$128,307 (65)

Steel Improvement & Forge Co.,  
 Cleveland, Ohio  
 Aircraft parts—\$24,961 (65)

# — T —

Tap-Rite Products Corp., Hackensack,  
 N. J.  
 Ordnance—\$94,450 (55)

Tenney Engineering, Inc., Union,  
 N. J.  
 Test equipment for Armed Services  
 —\$327,508 (45)

The Timken-Detroit Axle Co., De-  
 troit, Mich.  
 Ordnance—\$99,855 (50)

The Trane Co., La Crosse, Wis.  
 Aircraft parts—\$815,638 (45)

Transco Products, Inc., Los Angeles,  
 Calif.  
 Aircraft equipment—\$43,115 (70)

Trifari, Krussman & Fishel, Inc.,  
 Providence, R. I.  
 Ordnance—\$38,549 (65)

# — U —

Union Hardware Co., Torrington,  
 Conn.  
 Ordnance—\$59,525 (70)

(Turn to page 152, please)



With peak work cycles becoming more crucial by the day through-out your operations, Twin Disc is all the more aware that *supplying* industry with high-performance Friction and Hydraulic Drives is only half the picture.

Today, it's the follow-through that counts—and Twin Disc assures that vital follow-through with the fastest, largest and most thorough Repair and Parts Service of any manufacturer of industrial friction and hydraulic drives.

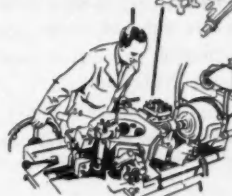
68

To keep your equipment rolling, Twin Disc now has:

SIXTY Parts Stations and EIGHT Factory Branches, fully staffed by experts ready to provide efficient service and to train your own service crews;

\$3 1/4

million inventory of repair parts and complete replacement units; distributed at 68 Strategic locations in every industrial area—throughout the Nation.



PRODUCTION schedule on service parts closely geared to requirements from the field.



Built for a long life... Backed for a lifetime

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois  
 BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA



For example, V. P. I. Liners (Vapor Phase Inhibitor) prevent rust and corrosion without need for covering products with oil, grease or wax. These and other new type liners protect spare parts from corrosion, for years, when metal ends are sealed on the container.

## Two New Types Available Are - - -

**THE UNIT PACK** for individual items meets exacting government specifications. For parts such as spark plugs, valves, meters, seal beam lamps, precision gears, gauges and bearings. (Seaming machines are furnished.)

**THE INTERMEDIATE TYPE** is for group packaging a variety of parts and materials. Made in telescope style with metal ends and heavy wall construction for added strength. For items such as nuts, washers, bolts, fuses, repair kits and fittings.

Write for complete information as to the type and construction of container for your exact needs.

**The CLEVELAND CONTAINER Co.**  
 6201 BARBERTON AVE. CLEVELAND 2, OHIO  
 • All-Fibre Cans • Combination Metal and Paper Cans  
 • Spirally Wound Tubes and Cores for all Purposes

PLANTS AND SALES OFFICES: Cleveland, Detroit, Chicago, Plymouth, Wisc., Jamestown, N. Y., Ogdensburg, N. Y. • ABRASIVE DIVISION at Cleveland  
 SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington Gas Light Bldg., Washington, D. C.; West Hartford, Conn.; Rochester, N. Y.  
 Cleveland Container Canada, Ltd., Prescott, Ontario • Offices in Toronto and Montreal



(Continued from page 151)

**United Aircraft Corp., E. Hartford, Conn.**

Aircraft engines & parts—\$1,000,000

(40)

Aircraft parts—\$800,000 (40)

**United Aircraft Corp., Windsor Locks, Conn.**

Aircraft parts—\$808,408 (65)

**United Aircraft Products, Inc., Dayton, Ohio**

Aircraft parts—\$145,669 (70)

**Universal Electric Corp., Owosso, Mich.**

Aircraft parts—\$128,329 (45)

## — V —

**Vard, Inc., Pasadena, Calif.**

Aircraft components—\$128,336 (55)

**The Viking Tool & Machine Co., Belleville, N. J.**

Aircraft parts—\$26,341 (70)

**Vinco Corp., Detroit, Mich.**

Aircraft parts—\$17,705 (65)

Aircraft parts—\$42,087 (70)

Aircraft parts—\$26,255 (65)

**Voi-Shan Manufacturing Co., Inc., Culver City, Calif.**

Aircraft parts—\$92,808 (55)

## — W —

**Walker Mfg. Co. of Wis., Jackson, Mich.**

Ordnance—\$48,454 (65)

**Weber Aircraft Corp., Burbank, Calif.**

Aircraft parts—\$29,975 (65)

**Wedglock Co., No. Hollywood, Calif.**

Aircraft parts—\$219,277 (70)

**Wemac Co., Inglewood, Calif.**

Aircraft parts—\$6,127 (65)

**Western Electric Co., Inc., Greensboro, N. C.**

Aircraft parts—\$119,704 (55)

**Western Gear Works, Belmont, Calif.**

Ordnance—\$20,039 (65)

**Westinghouse Electric Corp., Victory, Pa.**

Electronic equipment—\$212,089 (65)

**E. B. Wiggins Oil Tool Co., Inc., Los Angeles, Calif.**

Aircraft parts—\$46,896 (65)

**The Williams Heater Co., Madison, Ind.**

Aircraft parts—\$104,992 (65)

**Wood-Mosaic Corp., Louisville, Ky.**

Ordnance—\$54,725 (40)

## — Y —

**Yuba Mfg. Co., Benicia, Calif.**

Ordnance—\$360,000 (55)



**TODAY...**

*the quality of mercy is strained!*

● Just a bottle... and a tube... with blood plasma flowing slowly into the veins of a wounded man on the battle field... to save that man from almost certain death. And on that indispensable life line... a tiny blood plasma strainer made of Reynolds Wire Cloth. Small in size; big in performance. Not quite so dramatic, or so vital, are the many other *for-defense* uses of Reynolds Wire Cloth—in the production of high octane aviation gasoline... in making gunpowder... in radar reflective tow targets... and, of course, the tremendous number of Reynolds Wire Cloth applications in Agriculture, in Aviation, and the Automotive Industry—so essential in sustaining the defense and civilian economies of our nation in peacetime or in wartime. Reynolds combines 50 years' wire-weaving experience with modern facilities. Consult Reynolds engineers. No obligation.

**REYNOLDS**  
protects performance





# More Defense Contract Awards

**T**HIS latest list of defense prime contracts that have been awarded covers the period from July 18 to August 15. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts are given for contracts from \$25,000 to \$250,000. Contracts above \$250,000 are indicated by "over \$250,000," but their actual dollar amounts and unit quantities are not available.

## — A —

**AC Spark Plug Div., General Motors Corp., Flint, Michigan**  
Vehicle parts—19,275 ea—\$43,483

**ACF Brill Motor Co., Philadelphia, Pa.**  
Generator set—200 ea—\$698,146

**Acme Chair Company, Reading, Mich.**  
Vehicle parts—120 ea—\$95,400

**Aero Products Div., General Motors Corp., Vandalia, Ohio**  
Actuator parts—\$133,196

**Active Gear Co., Inc., Chicago, Illinois**  
Vehicle parts—5000 ea—\$36,200  
Vehicle parts—4526 ea—\$88,969

**Aircooled Motors, Inc., Syracuse, New York**  
Engines, spare parts & data—\$2,933,433  
Aircraft engines—66 ea—\$97,835  
Maintenance parts—85 ea—\$34,279

**Airesearch Mfg. Co., Los Angeles, Calif.**  
Spare parts—23 ea—\$231,559  
Thermostat—600 ea—\$339,789  
Actuator assembly—670 ea  
Turbine assy—\$316,398

**Algonac Mfg. Company, Algonac, Mich.**  
Replenishment of tools—594 ea—\$71,242

**Allison Division GMC, Indianapolis, Indiana**  
Vehicle parts—9000 ea—\$99,450  
J35-A-29 Turbo-Jet engines—17—\$277,134  
J33 Special tools & Equipment—\$200,000

**American Bosch Corp., Springfield, Mass.**  
Magneto assy—82—\$42,327  
Magneto assemblies—\$65,696  
Spart parts—\$512,698

**The American Coleman Co., Omaha, Neb.**  
Fabrication of spare automotive parts—212 ea—\$65,147

**American Generator & Armature Company, Chicago, Illinois**  
Vehicle parts—13,800 ea—\$95,638  
Vehicle parts—6500 ea—\$42,198  
Vehicle parts—7500 ea—\$117,019

**American Pipe & Steel Corp., Alhambra, California**  
Tank assembly—4600 ea—\$16,582,617

**American Smelting & Refining Co., Barber, New Jersey**  
Hardware—173,147 ft—\$715,317

**Austin Metal Prods. Inc., Detroit, Mich.**  
Vehicle parts—6998 ea—\$25,752

**Austin Trailer Equipment Company, Muskegon, Michigan**  
Vehicle parts—12,710 ea—\$34,474

**Auto Specialties Manufacturing Co., St. Joseph, Michigan**  
Facilities—\$33,690

**The Autocar Sales & Service Company, Ardmore, Pa.**  
Truck—35 ea—\$343,210

## — B —

**Baldwin - Lima - Hamilton Div., Eddystone Div., Phila., Pa.**  
Stand assembly—8 ea—\$75,054

**Bantam Bearings Div., The Torrington Co., S. Bend, Indiana**  
Hardware—2424 ea—\$80,367

(Turn to page 156, please)

## CUT COSTS...FASTEN "ON THE DOUBLE"

with the

# Chicago

## "214" DOUBLE RIVET SETTER



The "214" automatically feeds, inserts and clinches two rivets at a time...with speed that may mean a big saving in your fastening costs.

14" throat makes large assemblies easy to handle. For tubular rivets as large as 9/64", or less in diameter. Quick Change Rotary Type Hoppers and Raceway permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility.

Ask us how the "214" can help you cut costs. Send a sample of problem assembly (or blueprint) for free fastening analysis.

### FREE CATALOG

contains engineering information, rivet specifications and descriptions of 26 machines.

SEE EXHIBIT NATIONAL METAL CONGRESS, BOOTH 1819, OCT. 20-24, PHILA.

**Chicago Rivet & MACHINE CO.**  
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois  
Branch Factory: Tyrone, Pa.

**Actual Tests Prove:**

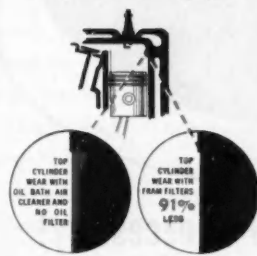
# FRAM FILTERS CUT ENGINE WEAR

## Bearing Wear Test



There was 95% less metal (by weight) worn from the bearings of the Fram-protected car.

## Top Cylinder Bore Wear Test

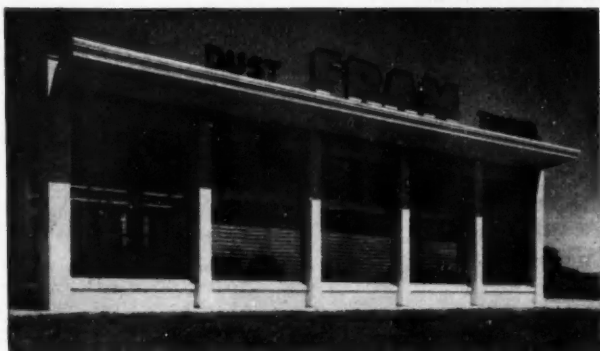


There was 91% less increase in top bore diameter in the cylinders of the Fram-protected car.

## Ring Wear Test



There was 93% less wear (measured by ring gap) on the rings of the Fram-protected car.



## Important Notice to Automotive Engineers:

The facilities of the Fram Dust Tunnel are at your disposal for testing and study of operation under severe dust conditions. Write, wire or phone for complete details. FRAM CORPORATION, Providence 16, R. I., In Canada: J. C. Adams Co., Ltd., Toronto, Ontario.

*Manufacturers of...*

FRAM OIL & MOTOR CLEANERS ★ FRAM FILCRON REPLACEMENT CARTRIDGES ★ FRAM CEL-PAK REPLACEMENT CARTRIDGES  
FRAM FILTRONIC REPLACEMENT CARTRIDGES ★ FRAM CARBURETOR AIR FILTERS ★ FRAM GASOLINE FILTERS ★ FRAM CRANKCASE AIR FILTERS ★ FRAM POSITIVE CRANKCASE VENTILATORS ★ FRAM RADIATOR & WATER CLEANERS ★ FRAM FUEL OIL FILTERS ★ FRAM INDUSTRIAL OIL AND FUEL FILTERS ★ FRAM SEPARATOR-FILTER FOR IMMISCIBLE LIQUIDS ★ FRAM CUSTOM-DESIGNED FILTERS FOR SPECIALIZED APPLICATIONS.



IN DEXTER, MICHIGAN, continuing research studies prove significant savings of engine life with the use of improved filter protection under high-concentration dust conditions. The charts above represent results obtained from recent tests using ordinary protection (oil bath air cleaner and no oil filter) and heavy-duty protection (Fram Carburetor Air Filter and Fram Oil & Motor Cleaner with Filcron Cartridge). New engines were used under identical controlled conditions for each phase of testing. Recent road tests and engine stand tests indicate these savings as representative of those obtainable under actual driving conditions. Your engines deserve Fram Protection.

# ENGINEERING ABILITY or...



## Why a good *SPRING* is necessary!

"This pressure reducing regulator is the HEART of the liquefied petroleum gas installation. On its performance depend the accuracy and reliability of the entire system . . . and the HEART of the regulator is the regulating spring which, because of its maximum length and large diameter, achieves super sensitivity and minimizes fluctuations in outlet pressures regardless of load demands."

Does this serve to make clear "Why a good spring is necessary"? Whether it's a comparatively simple or an infinitely complex piece of machinery . . . Automatic Spring Coiling Co. utilizes its superb *Engineering Ability*, the outgrowth of 30 years of spring specialization, to bring you the precision mechanical springs you need. Thus we are able to help you insure the successful and efficient performance of your product.

Make it a point to consult Automatic Spring Coiling Co. early in the job. Take advantage of our *Engineering Ability* to bring YOUR product up to peak operation with customized springs designed especially for you.

*Our experienced engineers are ready to survey your requirements without obligation. WRITE*



**AUTOMATIC SPRING COILING CO.**  
4048 West Thorndale Avenue  
CHICAGO 30, ILLINOIS

(Continued from page 154)

**Bayley Products Co., Detroit, Mich.**  
Vehicle parts—400 ea—\$42,758

**Bearing Co. of America, Lancaster, Pa.**  
Hardware—68,000 ea—\$100,580

**Beech Aircraft Corp., Wichita, Kansas**  
Spare parts—\$290,159

**Bethlehem Pacific Coast Steel Corp., San Francisco, Calif.**  
Hardware—245,778 ft.—\$31,912

**Bendix Prod. Div., Bendix Aviation Corp., S. Bend, Indiana**  
Vehicle parts—52,800—\$435,156  
Carburetor assy.—32 ea—\$45,729  
Carburetors & spare parts—\$900,000  
Overhaul & maintenance parts—\$41,285  
Brake assys.—297 ea—\$477,444  
Carburetor flow bench—22 ea—\$343,830  
Bleed check test stand—7 ea  
Air circuit test stand—7 ea  
Switch-Microphone—\$29,999  
Special tools—70 ea—\$48,328  
Wheels—1250 ea—\$3,351,560  
Brakes—1294 ea  
Wheel assembly—1688 ea—\$86,374  
Jet engines—Various—\$25,000  
Pumps—Various—\$335,707

**Bendix Westinghouse Automotive Air Brake Co., Elyria, Ohio**  
Vehicle parts—13,172 ea—\$62,865  
Vehicle parts—4800 ea—\$77,607  
Vehicle parts—16,200 ea—\$28,398

**Biederman Motors Corp., Cincinnati, Ohio**  
Vehicle parts—2000 ea—\$25,336  
Vehicle parts—7540 ea—\$26,099

**Blackstone Corp., Jamestown, N. Y.**  
Vehicle parts—2000 ea—\$61,560

**Boeing Airplane Co., Seattle, Washington**  
Spare parts—\$95,732  
Special tools—5 sets—\$123,624  
Fuel tanks—\$6,010,063  
Reinstall 8 engines—\$32,772  
Services & materials—\$185,058

**Brad Foote Gear Works, Inc., Cicero, Illinois**  
Vehicle parts—550 ea—\$840,317

**Brakes Incorporated, Long Island, N. Y.**  
Vehicle parts—3,425 ea—\$26,557

**Bridgeport Brass Co., Bridgeport, Conn.**  
Hardware—3,479,100 ea—\$99,449

**Briggs & Stratton Corp., Milwaukee, Wisconsin**  
Spare parts—Item 1 Thru 21—\$25,168

**Brown & Root, Inc., Houston, Texas**  
Engine assemblies—1,150 ea—\$1,095,000

**Brunswick Aircraft Supply Inc., Burbank, Calif.**  
Crankshaft assemblies—\$325,012  
Magneto parts—\$53,000

**Buda Company, Harvey, Illinois**  
Spare parts—\$50,478

**The Budd Company, Detroit, Michigan**  
Vehicle parts—600 ea—\$31,764  
Vehicle parts—1,191 ea—\$25,106

**Buffalo Weaving & Belting Company, Alliance, Ohio**  
Vehicle parts—44,400 ea—\$103,851

(Turn to page 159, please)

# tubing from strip

In one continuous, automatic operation, the AEF Tube Mill converts steel strip into the finest welded tubing. Each mill is a compact, high-speed unit that will produce the highest grade tubing with a minimum of labor, over-head, and capital investment. Over 30 years of successful performance demonstrate that the economy of operation—at  $\frac{1}{8}$  of one cent per each foot length of tubing—permits the return of the original investment in intervals ranging from 28 days to 6 months. It is impossible to purchase your pipe and tubing

requirements to compete with rolling your own on an AEF Tube Mill. Our engineers will plan your installation and give your operators training in operation and procedures. Write us giving the sizes and quantities of tubing needed and the uses for which it is intended. Tubing is guaranteed to be plus or minus .003" in diameter and concentricity. AEF Tube Mills are manufactured in three sizes, to produce pipe and tubing with wall thicknesses of .025" to .157" and outside diameters from  $\frac{1}{2}$ " to  $4\frac{1}{2}$ " O.D.

**AMERICAN ELECTRIC FUSION CORPORATION**

CHICAGO 47, ILLINOIS, U. S. A.



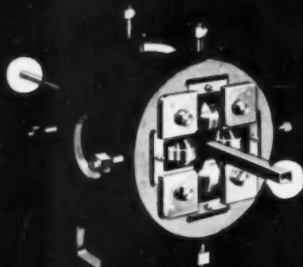
# AMERICAN ELECTRIC FUSION CORP.

MANUFACTURERS OF ELECTRICAL WELDING EQUIPMENT

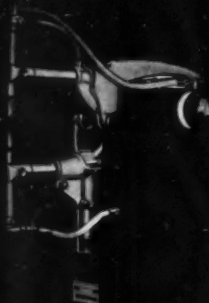
2600 DIVERSEY AVENUE

CHICAGO 47, ILLINOIS, U.S.A.

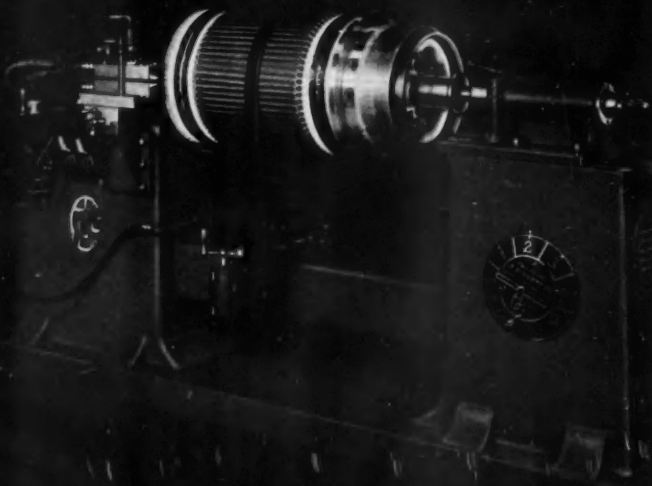
Round tubing produced by AEF Tube Mills can be formed into square, triangular, or other sections with the AEF Turks-head. Operates at Tube Mill speed. Specially formed tubing is cut by a special cutter, interchangeable with the standard AEF Cut-off Unit.



All AEF Spot Welders are designed to permit the maximum adjustment to meet specific individual requirements. They may be operated by manual foot pressure or by automatic air. Each Spot Welder is equipped with the patented "Kold-point" Electrode Cooling System. The "Koldpoint" increases efficiency and production speed and insures a low cost of operation. It lengthens the life of the welding tips, reduces time and expense of point dressing, and produces more uniform welding. AEF Spot Welders are manufactured in three mechanical size groups and in six transformer capacities.



## • QUALITY • MACHINES •



The CBG - 24 Brazing Machine—developed originally by AEF for a leading Diesel locomotive manufacturer—is built for brazing and silver soldering coil ends of generator and motor armatures. Accommodates armatures of 18" to 42" in diameter and can be adapted with slight modification to any diameter requirements. The CBG-24 may also be used as a source of power supply for portable brazing equipment—and for other brazing and soldering applications.



(Continued from page 156)

## — C —

**Canfield Tool & Die, Detroit, Michigan**  
Vehicle parts—650 ea—\$100,015

**Carron & Company, Induseter, Michigan**  
Vehicle parts—6,220 ea—\$92,576

**Carter Carburetor Corp., St. Louis, Mo.**  
Vehicle parts—156,500 ea—\$363,486

**Cessna Aircraft Co., Wichita, Kansas**  
Airplanes—2 ea—\$65,030

**Chandler-Evans Div., Niles-Bement-Pond Co., W. Hartford, Conn.**  
Spare parts—\$2,359,489

**Checker Cab Mfg. Co., Kalamazoo, Michigan**  
Trailer—26,950 ea—\$20,056,459

**Chevrolet Motor Div., GMC, Detroit, Michigan**  
Truck—197 ea—\$36,386  
Truck—80 ea—\$100,682  
Truck—7 ea—\$28,704  
Truck—571 ea—\$565,252  
Truck—668 ea—\$1,074,803  
Truck—358 ea—\$605,789  
Truck—562 ea—\$594,376

**Chrysler Corporation, Detroit, Mich.**  
Vehicle parts—9,000 ea—\$18,444  
Spare engine assy.—\$100,462

**Clark Cable Corp., Cleveland, Ohio**  
Vehicle parts—2,320 ea—\$29,546

**Cleveland Diesel Engine Div., General Motors Corp., Cleveland, Ohio**  
Diesel engine parts—Job—\$29,877

**Clyde Eng. & Mfg. Corp., Royal Oak, Michigan**  
Vehicle parts—7,300 ea—\$28,470

**Columbian Steel Tank Co., Kansas City, Mo.**  
Vehicle parts—7,400 ea—\$28,347

**Commercial Filter Corp., Boston, Mass.**  
Oil filter elements—41,040 ea—\$38,824

**Consolidated Industries, Inc., Lafayette, Ind.**  
Tank assembly—12,000 ea—\$2,914,464

**Consolidated Vultee Aircraft Corp., San Diego, California**  
Maint parts—1,600 ea—\$142,566

**Consolidated Vultee Aircraft Corp., Fort Worth, Texas**  
Propeller test—\$14,536,990  
Services & materials—\$6,064,022

**Continental Electric Co., Inc., Newark, N. J.**  
Maintenance parts—\$54,581

**Continental Foundry & Machine Company, E. Chicago, Indiana**  
Turret—60 ea—\$65,460

**Continental Motors Corp., Detroit, Mich.**  
Spare parts—1 lot—\$145,792  
Spare parts—5—2 sts—\$201,210  
Engines—Job—\$56,992

**Fuel Injection system installed—Job—\$27,579**  
Engines—Job—\$56,305

**Dev. of Texaco Combustion Process—\$98,021**  
Dev. of AO-895-4 & AOI-895-6 model—\$185,118  
Dev. of AO-895-3 and AOI-895-3 model engines—\$146,123

**Modify one Govt. owned model AV-1195-2 eng.—\$57,592**  
Modification kits—842—\$350,766  
Engines—30—\$663,985

## Continental Motors Corp., Muskegon, Mich.

Vehicle parts—47,500 ea—\$255,075  
Special tools—\$60,316  
Engines—422 ea—\$1,478,333

**Cooper Tire & Rubber Co., Findlay, Ohio**  
Tires—349 ea—\$82,649

**S. J. Corbett Company, Detroit, Mich.**  
Vehicle parts—5,000 ea—\$41,528  
Vehicle parts—47,500 ea—\$255,075

**The Corbett Company, Henderson, N. C.**  
Vehicle parts—250 ea—\$36,065

**The Crescent Co., Inc., Pawtucket, R. I.**  
Hardware—349,000 ea—\$26,462

**Curtiss-Wright Corp., Electronic Div., Carlstadt, N. J.**

Spare parts—Lot—\$125,122  
Spare part—Lot—\$346,358

## — D —

**Dana Corporation, Toledo, Ohio**  
Vehicle parts—9,400 ea—\$145,579  
Vehicle parts—1,400 ea—\$53,900  
Vehicle parts—1,720 ea—\$28,794  
Vehicle parts—1,650 ea—\$27,193  
Vehicle parts—6,300 ea—\$100,038  
Vehicle parts—400 ea—\$201,735  
Vehicle parts—2,000 ea—\$33,480  
Vehicle parts—850 ea—\$61,643

**The Dayton Rubber Co., Dayton, Ohio**  
Tire—1,194 ea—\$54,589  
Vehicle parts—135 ea—\$51,518

(Turn to page 160, please)

# SLASH ASSEMBLY COSTS



-- on Moulding Strips  
and Deck Handles

-- on Tail and  
Parking Lights

-- on Hood Ornaments  
and Nameplates

-- on Instrument  
Mountings

## Washer Type PALNUT LOCK NUTS

Handle ONE part

instead of THREE



"75% reduction on  
assembly costs"  
reports  
one manufacturer

Low-cost, one-piece Washer Type PALNUT Locknuts do the job of an ordinary nut, lockwasher and plain washer combined. You save parts and handling operations—get speedy assembly with hand or power drivers. Resilient lock greatly reduces stud breakage during assembly. PALNUT double-locking spring action holds tight under vibration. Built-in washer spans holes and slots. Wide range of standard sizes. Send details of assembly for free samples and literature.

The PALNUT Co. 60 Cordier St., Irvington VI, N. J.  
Detroit: 730 West Eight Mile Road



# PALNUT

TRADE MARK

# LOCK NUTS

Whether You're Tooling for:



or



Every Engineering Dept. and Model Shop Needs

# PULLMAX

THE MOST COMPLETE LINE OF SHEET STEEL AND PLATE WORKING MACHINES

for Working Sheet or Plate Metal in Making Sample Parts and Small Production Runs Without the Expense of Costly Dies

Company after company is discovering the complete versatility of the amazing Pullmax machines. Made in many sizes to fit your requirements.

A reciprocating movable upper tool and stationary lower tool provides a smooth perpendicular cut that requires no further finishing. Upper tool can be raised to insert or remove work for cutting in center. Cutting capacities listed are for cutting mild steel.

## PULLMAX DOES

- ★ STRAIGHT CUTTING
- ★ CIRCLE CUTTING
- ★ INSIDE CUTTING
- ★ IRREGULAR CUTTING
- ★ SLOT CUTTING
- ★ BEADING
- ★ FOLDING, OFFSETTING
- ★ NIBBLING



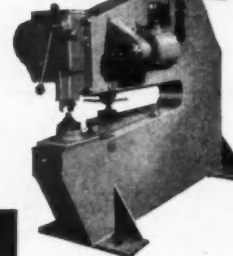
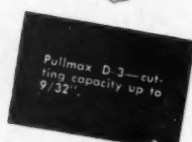
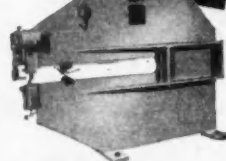
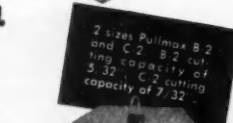
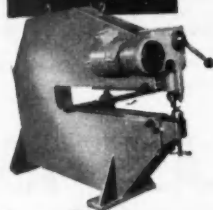
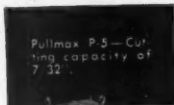
PULLMAX MACHINES WORK:  
MILD STEEL WIRE MESH  
STAINLESS STEEL PLASTIC  
NON FERROUS METAL and other materials



WRITE FOR LITERATURE AND PRICES TODAY

AMERICAN PULLMAX CO., INC.

2465 North Sheffield Avenue, Chicago 14, Illinois



(Continued from page 159)

**Denman Rubber Mfg. Co., Warren, Ohio**

Tire—700 ea—\$27.461

**Diamond T Motor Car Co., Chicago, Illinois**

Vehicle parts—2,200 ea—\$248,116

Vehicle parts—40,236 ea—\$93,750

**Douglas Aircraft Co., Long Beach, Calif.**

Special tools—\$61,356

**Dow-Elco Inc., Monte Bello, California**

Engine shock mounts—\$31,224

**Drayer-Hanson, Inc., Los Angeles, Calif.**

Tank assembly—25,000 ea—\$4,173,750

**Dunbar Kapple Inc., Geneva, Illinois**

Trailer—149 sets—\$8,403,802

**Dupage Gear & Machine Company, Elmhurst, Illinois**

Vehicle parts—2,300 ea—\$34,125

Vehicle parts—1,600 ea—\$55,880

— E —

**Earl Gear & Machine Co., Philadelphia, Pa.**

Vehicle parts—125 ea—\$34,062

**Eaton Mfg. Company, Detroit, Michigan**

Vehicle parts—300 ea—\$33,000

**Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.**

Indicator—222 ea—\$26,394

Indicator, A-15—\$120,112

Fuel flow indicator—215 ea—\$50,077

Fuel flow transmitter—966 ea—\$226,440

Engine instr. maint. parts—59 ea—\$131,504

Indicators—7,516 ea

Indicators—1,445 ea

Indicators—3,099 ea—\$1,518,816

Generators—518 ea—\$201,491

Indicator—443 ea—\$25,353

Indicators—6,149 ea—\$5,905,014

Miscellaneous spare parts—\$312,513

Phase inverters—1,000 ea

Regulator—15,652 ea—\$564,618

Accelerometer—5,818 ea—\$670,815

Accelerometer—1,300 ea—\$131,954

Generators, type M-3—\$76,091

Spare parts—\$35,832

Indicator, pressure torque—1,764 ea—\$292,097

Indicator—1,975 ea—\$94,457

**The Electric Auto Lite Co., Toledo, Ohio**

Vehicle parts—17,500 ea—\$52,968

Vehicle parts—48,830 ea—\$75,930

Vehicle parts—15,035 ea—\$163,050

Vehicle part—9,620 ea—\$56,547

Spark plug—36,425 ea—\$43,439

Spark plugs—238,514 ea—\$290,987

**Evans Products Co., Plymouth, Michigan**

Motor parts—\$17,500—\$2,163,150

— F —

**Fairchild Engine Div., Fairchild Engine & Airplane Corp., Farmingdale, L. I., New York**

Spare parts—156 ea—\$1,450,218

Power plants—12 ea—\$199,566

Relief valve assy.—6,500 ea

Magneto lead & gear assy.—1,800 ea—\$125,315

**Fargo Motor Corp., Detroit, Mich.**

Truck—32 ea—\$74,906

Truck—769 set—\$1,398,205

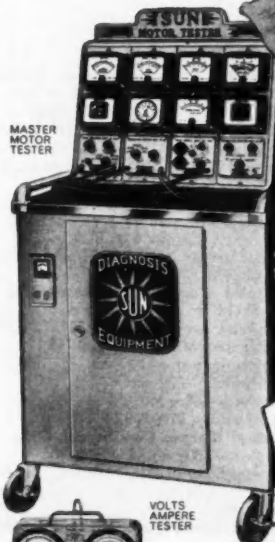
Truck—202 ea—\$513,973

Truck—72 ea—\$86,494

(Turn to page 162, please)

for **BOTH**  
voltages...

12



MASTER  
MOTOR  
TESTER



SUN  
makes it easier  
for you

**to service the cars of today... and tomorrow**  
...with test equipment in advance of the times



VOLTS  
AMPERE  
TESTER



BATTERY  
STARTER  
TESTER



POWER  
TIMING  
LIGHT



BATTERY  
CHARGER  
UNIT

DON'T GUESS—TEST!



Anticipating new and revolutionary innovations in the automotive industry has been a major factor in making SUN—the world's largest manufacturer of automotive engine and electrical system test equipment.

Available NOW... is the newly engineered SUN Master Motor Tester and Accessory Group for completely and accurately testing both 6 and 12 volt automotive engines. Each of these new units has been designed to make every test on 6 and 12 volt systems in compliance with the car manufacturer's approved methods. It is now possible, with this new SUN Equipment, to modernize your testing department today—in the sure knowledge that these new units will not only service the cars and trucks of the present—but those of tomorrow as well.

To help you modernize... SUN has developed a Modernization Plan that tells you how easily you can convert your present test equipment—to the new 6-12 volt units... how your old 6 volt testers can be used as a valuable trade-in. Prepare for tomorrow—today! Talk to your nearest SUN Representative—or write directly to us for complete information on the Modernization Plan.

SUN Equipment is also available for fleet and military use—in 6-12-24 volt units.

**SUN ELECTRIC CORPORATION** 6373 AVONDALE AVENUE  
CHICAGO 31, ILLINOIS  
SUN Technical Training Schools in 16 cities. Night and Day Courses.

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(Continued from page 160)

Truck—2,038 ea—\$2,130,199  
 Truck—315 ea—\$584,608  
**Federal Mfg. & Engr. Corp., Brooklyn, N. Y.**  
 Spare parts—\$163,156  
**Federal Motor Truck Co., Detroit, Michigan**  
 Vehicle parts—660 ea—\$44,215  
 Vehicle parts—1,700 ea—\$39,984  
 Truck—7 ea—\$295,880  
**Firestone Tire & Rubber Co., Akron, Ohio**  
 Hardware—397,850 ea—\$131,210  
**Fisher Body Division, General Motors Corp., Detroit, Mich.**  
 Turret assembly (M47) completely mach.—100 ea—\$436,719

**Fletcher Avia. Corp., Pasadena, California**  
 Tank assy. capacity—328 ea—\$491,924  
 Tank assy.—20,000 ea—\$3,402,000  
 Fuel tank—41,514 ea—\$21,183,110  
 Tank assembly—6,592 ea—\$5,553,403  
**Fontaine Truck Equip. Company, Inc., Birmingham, Ala.**  
 Semitrailer—40 ea—\$135,880  
**Ford Division, Ford Motor Co., Washington, D. C.**  
 Truck—39 ea—\$57,569  
 Truck—585 ea—\$687,282  
 Truck—125 ea—\$237,692  
 Truck—67 ea—\$190,645  
**Ford Motor Co., Dearborn, Michigan**  
 Tank, T48—\$4,250,000

**The Four Wheel Drive Auto Company, Clintenville, Wis.**  
 Trucks—5 ea—\$43,189  
**E. T. Frain Lock Co., Lancaster, Pa.**  
 Hardware—50,000 ea—\$44,100  
**Fruehauf Trailer Co., Detroit, Mich.**  
 Vehicle parts—74 ea—\$238,632  
 Semitrailer—74 ea—\$238,632  
 Trailers—44 ea—\$229,007  
 Vehicle parts—1,420 ea—\$25,331  
 Vehicle parts—1,500 ea—\$122,220  
 Semitrailers—20 ea—\$105,483  
 Crane and hoist assembly—310—\$96,180.30  
 Trailer—499 sets—\$37,579,555  
**Fulton Syphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.**  
 Vehicle parts—121,000 ea—\$57,838

# copper can be saved in radiators



Less copper is needed for smaller radiators of sealed cooling systems. To save it for National Defense and yet sustain the modern standard for cooling performance, specify DOLE THERMOSTATS. They have been designed to safeguard the cooling efficiency of the smaller radiator. DOLE THERMOSTATS allow the sealed cooling system to operate at peak efficiency; and the influence of pump pressures and cap pressures is fully offset. The engine operates under the constant protection of a most effective automatic temperature control.

Your ultimate buyer is assured of the quality and performance he expects under your name. Your nation's copper hungry defense industry benefits by the share you are able to relinquish.

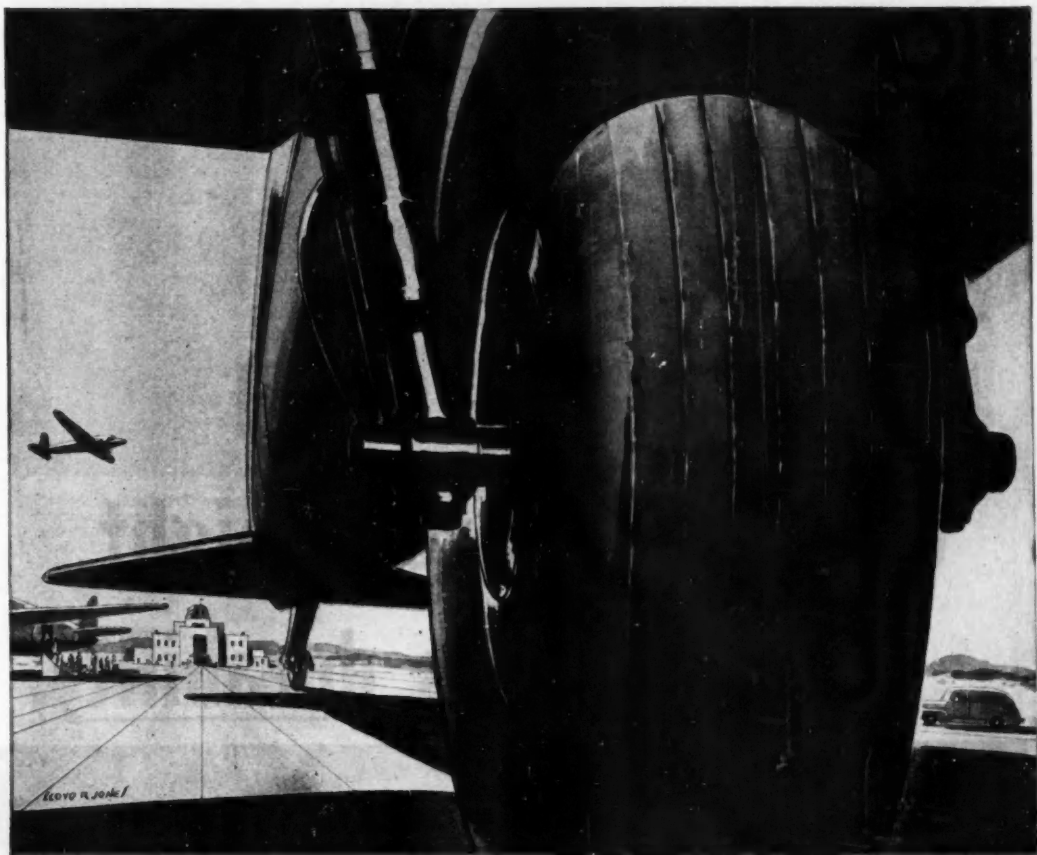
with  
**DOLE**  
**THERMOSTATS**  
 to regulate  
 cooling



**THE DOLE VALVE COMPANY • 1901-1941 Carroll Ave., Chicago 12, Illinois**  
 Chicago • Detroit • Los Angeles

— G —

**Gar Wood Inds. Inc., Wayne, Michigan**  
 Vehicle parts—11,611 ea—\$143,850  
 Vehicle parts—2,700 ea—\$78,678  
 Vehicle parts—716 ea—\$27,231  
 Vehicle parts—3,560 ea—\$29,067  
**General Electric Co., Schenectady, N. Y.**  
 Vehicle parts—7,170 qty.—\$89,816  
 Indicator—342 ea—\$36,109  
 Switches and relays—9 ea—\$61,174  
 Indicator—872 ea—\$84,225  
 Maintenance and overhaul parts—\$1,500,000  
 Indicator electric tachometer—1,363 ea—\$121,036  
 Regulator assy.—100 ea—\$34,980  
 Turbosuperchargers—\$2,090,108  
 Starter-generator—300 ea—\$176,525  
 Transformer—500 ea  
 Magnetos—\$364,050  
 Spare parts—\$740,006  
**General Electric Co., Dayton, Ohio**  
 Regulator—800 ea—\$172,872  
**General Electric Co., Philadelphia, Pa.**  
 Aircraft generator drive—100 HP—6 ea—\$294,399  
**General Electric Co., Milwaukee, Wisconsin**  
 Belatron x-ray apparatus—\$144,000  
**General Laboratory Assoc., Inc., Norwich, N. Y.**  
 Maintenance parts—258 ea—\$74,527  
**General Motors Corp., GMC Truck & Coach Div., E. Pontiac, Mich.**  
 Tank-automotive spare parts—119,220—\$370,737  
 Truck—11 ea—\$61,980  
 Vehicle parts—4,920 ea—\$52,053  
 Truck—23 ea—\$281,665  
 Truck—44 ea—\$510,314  
 Vehicle parts—20,000 ea—\$42,321  
 Vehicle parts—20,500 ea—\$25,133  
**General Motors Corp., Packard Electric Div., Warren, Ohio**  
 Harness assy.—var—\$50,951.73  
**General Motors Corp., Tarnstedt Div., Detroit, Michigan**  
 Range finders, T42—60—\$580,319  
 Range finders, T26—1,315—\$13,500,000  
**General Motors Corp., Tarnstedt Div., Plymouth, Michigan**  
 Range finder T-46—1,393—\$8,997,307  
 Concurrent spare parts—13 sets  
**General Tire & Rubber Co., Akron, Ohio**  
 Wheel assy.—2,433 ea—\$144,392  
**The B. F. Goodrich Co., Dayton, Ohio**  
 Wheel assy. 8.50 x 6—200 ea—\$43,097  
 Wheel assy. 27"—500 ea  
 (Turn to page 166, please)



## Legs for lethal eagles

Legs for lethal eagles — hydraulic landing gear that cushion Uncle Sam's big bombers as they come down to roost — this is just one of the many uses of Ostuco Tubing by manufacturers in the progressive aircraft industry. Aircraft designers are specifying Ostuco Tubing for fuel lines, engine mounts, landing gear, and many other applications because of its inherent strength without weight characteristics and the ease with which it can be machined, formed and fabricated to the most exacting requirements.

But whether your products are aeronautical or of a distinctly different nature, you owe it to your future to investigate the advantages of Ostuco Tubing for improving quality and reducing cost.

We cannot always promise early delivery estimates on new civilian orders, because of military demands, but it will pay you to consult our experienced engineers about Ostuco Tubing when redesigning your products to meet future competition.



### THE OHIO SEAMLESS TUBE COMPANY

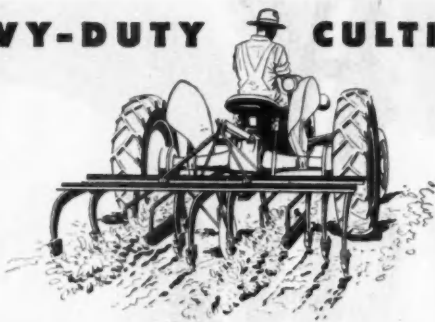
Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing  
Plant and General Offices: SHELBY, OHIO



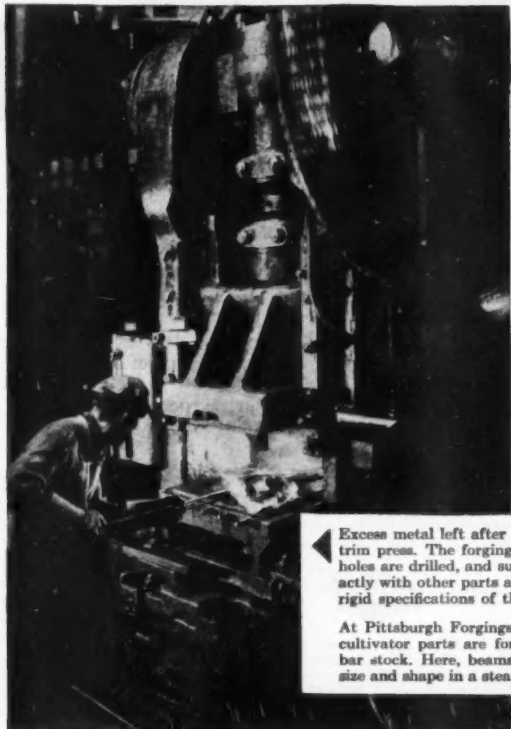
**SALES OFFICES:** Birmingham, P. O. Box 2021 • Chicago, Civic Opera Bldg., 20 N. Wacker Dr.  
Cleveland, 1328 Citizens Bldg. • Dayton, 511 Salem Ave. • Detroit, 520 W. Eight Mile Road,  
Ferndale • Houston, 6833 Avenue W, Central Park • Los Angeles, Suite 300-170 So. Beverly  
Drive, Beverly Hills • Moline, 617 15th St. • New York, 70 East 45th St. • Philadelphia,  
1613 Packard Bldg., 15th & Chestnut • Pittsburgh, 1206 Pinewood Drive • St. Louis, 1230  
North Main St. • Seattle, 3104 Smith Tower • Syracuse, 501 Roberts Ave. • Tulsa, 733 Ken-  
nedy Bldg. • Wichita, 622 E. Third St. • Canadian Representative: Railway & Power Corp., Ltd.



**IN THIS HEAVY-DUTY CULTIVATOR**



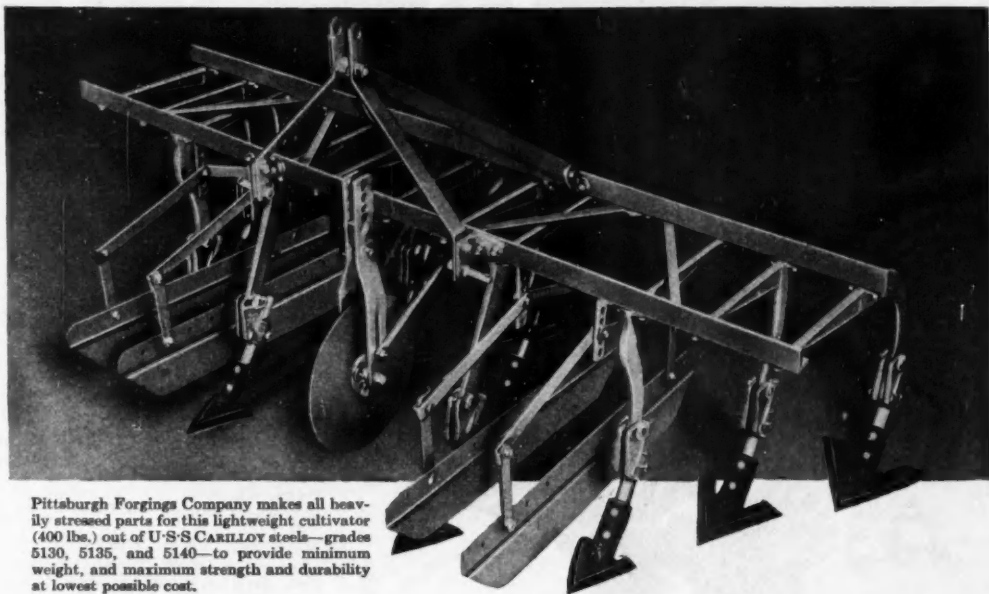
**U·S·S CARILLOY steel**  
**effectively saves weight,**  
**increases durability,**



Excess metal left after forging is removed in this trim press. The forging then is straightened, bolt holes are drilled, and surfaces that must align exactly with other parts are accurately milled to the rigid specifications of these cultivators.

At Pittsburgh Forgings Company precision-made cultivator parts are forged from CARILLOY steel bar stock. Here, beams are being forged to final size and shape in a steam hammer.





Pittsburgh Forgings Company makes all heavily stressed parts for this lightweight cultivator (400 lbs.) out of U-S-S CARILLOY steels—grades 5130, 5135, and 5140—to provide minimum weight, and maximum strength and durability at lowest possible cost.

## and keeps costs down

TO pack the maximum strength into this heavy-duty lift-type cultivator and to keep its weight as low as possible, Pittsburgh Forgings Company of Coraopolis, Pa., has used U-S-S CARILLOY alloy steel in the shanks, beams, and main frame.

The excellent performance this equipment has been delivering is proof that many parts that must operate in extremely tough service can be made of alloy steels that do not contain critical elements. The three grades of U-S-S CARILLOY used here—CARILLOY 5130, 5135, and 5140—were selected by Pittsburgh Forgings Company years ago for the express purpose of providing minimum weight, maximum strength and durability at the lowest possible cost.

Strong and tough to permit speeds up to 6 miles per hour through heavy soil, CARILLOY steel construction has made it possible to reduce cultivator weight to only 400 lbs. This is about half that of comparable units made of ordinary carbon steel—

well below the limit which the tractor lifting mechanism is designed to carry, light enough to be easily shifted on the ground by one man.

U-S-S CARILLOY alloy steel does more in this equipment than provide increased strength, greater durability, and added resistance to wear. It enables the manufacturer to safely decrease the size and weight of all heavily stressed parts, with the result that less steel is required and his costs can be kept well in line with competition.

Our metallurgists have had wide experience with similar applications in alloy steels and have developed special heat-treating procedures that make it possible to obtain maximum mechanical properties from them. We will be glad to assist you in selecting the steel and heat treating methods best suited to your product, and we believe we can help you. Just call the nearest District Sales Office, or write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

# U·S·S Carilloy Steels

UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



2-1439

UNITED STATES STEEL

# GEARS

## by Fairfield



### A Plus Value in Any Product!

**I**F GEARS are a part of the machines you make, there is no finer recommendation for YOUR PRODUCT than to be able to say it is "Equipped with FAIRFIELD GEARS!"

At Fairfield, your gears are in the hands of specialists equipped with every modern facility for producing fine gears efficiently and economically. *For the Best in Gears, Specify Fairfield!*

#### Gears made to order:

SPUR • HELICAL • HERRINGBONE • SPIRAL BEVEL  
STRAIGHT BEVEL • HYPOID • ZEROL • WORMS and  
WORM GEARS • SPLINED SHAFTS • DIFFERENTIALS

## FAIRFIELD

### MANUFACTURING CO.

2303 So. Concord Rd.  
LAFAYETTE, IND.

Send for  
Illustrated Brochure



(Continued from page 162)

Tail wheel assy. 8.00-300 ea  
Wheel assys-727 ea  
Brake assys-\$1,014.429  
Wheel assembly-300 ea-\$61.132  
Wheels, brakes, spare parts-\$1,051.436  
Wheel assembly-333 ea-\$84.794  
Nose wheel assy.-1,888 ea-\$83.603  
**Goodyear Aircraft Corp., Akron, Ohio**  
Spare parts-1 lot ea-\$85.833  
**Goodyear Tire & Rubber Company, Akron, Ohio**  
Wheel assy.-45 ea-\$45.329  
Wheel assy.-1,174 ea-\$406.440  
Wheel assembly-652 ea-\$186.410  
Brake assembly-520 ea  
Wheel assembly-537 ea-\$162.739  
Brake assembly-555 ea  
Wheel assemblies-412 ea-\$287.279  
Brake assemblies-468 ea  
Rubber track blocks-150,000 ea-\$380.030  
Main wheel & brake assys.-913 ea-\$318.040  
Wheels-230 ea-\$123.563  
Brakes-244 ea  
Nose wheel assembly-1,500 ea-\$173.370  
Wheel assy.-506 ea-\$106.224  
Brake assy.-422 ea  
Nose wheel assy.-132 ea  
Wheel assy.-1,850 ea-\$471.246  
Brake assy.-1,850 ea  
**Gould Nat'l. Batteries, Inc., Depew, New York**  
Batteries-7,828 ea-\$363.477  
**Gramm Trailer Corp., Lima, Ohio**  
Vehicle parts-85 ea-\$222.750  
Semitrailer-12 ea-\$47.239  
**Grumman Aircraft Eng. Corp., Bethpage, L. I., New York**  
Aircraft spare parts-1,647 ea-\$30.267

— H —

**E. O. Habegger Co., Philadelphia, Pa.**  
Vehicle parts-100 ea-\$29.015  
**Henney Motor Co., Inc., Freeport, Illinois**  
Truck-256 ea-\$762.660  
**Hercules Motors Corp., Canton, Ohio**  
Vehicle parts-6,450 ea-\$77.271  
Spare parts-\$118.239  
Spare parts-\$36.923  
**Hiller Helicopters, Palo Alto, Calif.**  
Parts-20 ea-\$48.866  
**Huron Metal Products, Brooklyn, N. Y.**  
Vehicle parts-1,380 ea-\$35.604  
**Hycon Mfg. Company, Pasadena, California**  
Brake assy.-3 ea-\$42.500  
Brake assy.-3 ea  
Curtain assy.-2 ea  
Shutter assy.-2 ea  
**Hyde Corporation, Fort Worth, Texas**  
Semitrailer-2,067 ea-\$4,236.900  
Set of spare parts-21 sets ea

— I —

**Ingersoll Products Div., Borg-Warner Corp., Chicago, Illinois**  
Tank assembly-9,394 ea-\$1,995.849  
**International Harvester Co., Detroit, Mich.**  
Vehicle parts-2,000 ea-\$75.155  
**International Harvester Co., Washington, D. C.**  
Truck-51 ea-\$300.865  
Truck-22 ea-\$140.677  
(Turn to page 168, please)

# *Sign of Superiority*

## FOR 45 YEARS



**Facilities of 13 Strategically Located Plants of L. A. Young,  
World's Largest Manufacturer of Springs and Diversified  
Wire Products for American Industries for 45 Years Are  
In Defense Production for Both Government and Industry.**

### **L. A. YOUNG SPRING & WIRE CORPORATION**

**GENERAL OFFICES:** Detroit 11, Michigan . . . **IN CANADA:** L. A. YOUNG INDUSTRIES, Ltd., Windsor, Ont.

**13 PLANTS:** 3 in Detroit, Mich. • Chicago and Joliet, Ill. • Trenton, N. J. • Memphis, Tenn.  
Leeds, Ala. • Los Angeles and San Leandro, Calif. • Windsor, Toronto and Montreal, Canada

(Continued from page 166)

Truck—45 ea—\$195,334  
Truck—159 ea—\$1,004,720  
Bus—330 ea—\$1,231,208  
Truck—96 ea—\$438,465  
Truck—16 ea—\$30,431  
Inter-State Machinery Sales, Detroit, Mich.  
Vehicle parts—1,500 ea—\$297,000

## — J —

Jack & Heintz, Inc., Cleveland, Ohio  
Maintenance overhaul parts—\$54,496  
Phase inverters—630 ea—\$244,642  
Generators—3,360 ea—\$1,183,259

Jacobs Air Craft Engine Co., Barium Steel Corp., Pottstown, Pa.  
Maintenance spare parts—\$47,707  
Spare parts—11,232 ea—\$372,226  
John Trailer Division, Pressed Steel Car Co., Inc., Chicago, Ill.  
Semitrailer—195 ea—\$726,349  
Semitrailer—1,877 ea—\$6,179,318  
Jones & Laughlin Steel Corp., Pittsburgh, Pa.  
Hardware—16,636 shts—\$97,765  
Hardware—5,434 ft—\$28,457

## — K —

Kelsey Hayes Wheel Co., Detroit, Michigan  
Vehicle parts—50,000 ea—\$151,200

Kentucky Mfg. Co., R. C. Tway Co., Inc., Louisville, Kentucky  
Trailer—10 ea—\$32,628  
Semitrailer—136 ea—\$322,654  
Semitrailer—21 ea—\$69,187  
Semitrailer—16 ea—\$105,446  
Kenworth Motor Truck Corp., Seattle, Wash.  
Vehicle parts—3,100 ea—\$27,311  
Killsman Instrument Corp., Elmhurst, N. Y.  
Indicator: airspeed—241 ea—\$33,328  
Knorr-Maynard, Inc., Detroit, Michigan  
Hardware—60,000 ea—\$36,240  
Kollsman Instr. Corp., Elmhurst, N. Y.  
Airspeed indicators—493 ea—\$25,000  
Tachometer indicators—282 ea—\$27,122

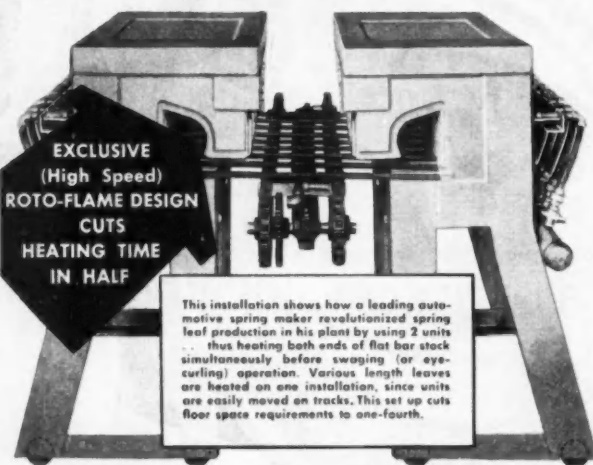
## — L —

E. A. Laboratories, Inc., Brooklyn, N. Y.  
Vehicle parts—82,500 ea—\$229,350  
Lacrosse Trailer Corp., Lacrosse, Wisconsin  
Semitrailer—87 ea—\$223,155  
Semitrailer—35 ea—\$87,850  
Semitrailer—5 ea—\$124,162  
The Lauson Div., Hart-Carter, New Holstein, Wis.  
Spare parts for Lauson motors—\$102,826  
Lear, Inc., Grand Rapids, Michigan  
Spare parts—\$187,078  
Lee Tire & Rubber Co. of New York, Inc., Conshohocken, Pa.  
Tire—900 ea—\$38,745  
Leece-Neville Co., Cleveland, Ohio  
Generators, engine driven—494 ea—\$71,457  
Liggett Spring & Axle Co., Monongahela, Pa.  
Vehicle parts—76,000 ea—\$104,120  
Link Aviation, Inc., Binghamton, N. Y.  
Trainer, jet propelled aircraft—174 ea—\$2,000,000  
Trainers, instr.—76 ea—\$6,814,025  
Misc. spare parts—\$49,987  
Linn Coach & Truck Div., Great American Inds., Inc., Oneonta, New York  
Trailer, mount, M20—913 ea—\$526,151  
Trailer—800 ea—\$1,928,048  
Lockheed Aircraft Co., Burbank, California  
Kits—39 ea—\$45,969  
Kits—24 ea  
Kits—85  
Kits—75 ea  
Kits—158 ea—\$96,286  
T-33A—1 ea—\$150,000  
Loner-Wood Tool & Eng'g. Company, Detroit, Mich.  
Vehicle parts—1400 ea—\$56,056  
Lycoming-Spencer Div., AVCO Mfg. Corp., Williamsport, Pa.  
Spare parts—\$116,156  
Exhaust riser assy.—300 ea—\$101,250  
Spare parts—\$308,259

## — Mc —

I. G. McAlister, Inc., Hollywood, Calif.  
Spare parts—\$199,744  
McCabe-Powers Auto Body Company, St. Louis, Mo.  
Vehicle parts—85 ea—\$26,851  
McCord Corporation, Detroit, Mich.  
Vehicle parts—1700 ea—\$82,620  
(Turn to page 170, please)

# Twin ROTO-FLAME FURNACES QUADRUPLE "END HEATING" PRODUCTION



**Boosts Production.** Steps up output through much faster heating . . . provides a uniform controlled flow of work at a uniform temperature.

**Cuts Operating Costs.** Requires less labor, operation can be made 100% automatic . . . saves fuel, no wasted heat . . . saves floor space . . . prolongs die life by virtually eliminating scale.

**Provides Better Working Conditions.** Exclusive design deflects heat away from operator and onto the work . . . cleaner—utilizes any type of gas fuel.

Just as the Roto-Flame Furnace has increased production efficiency for this well-known spring manufacturer, it can do the same for you . . . whether end and heating is required for forging, swaging, upsetting, threading, hardening, or annealing. Ask for Bulletin No. 350.



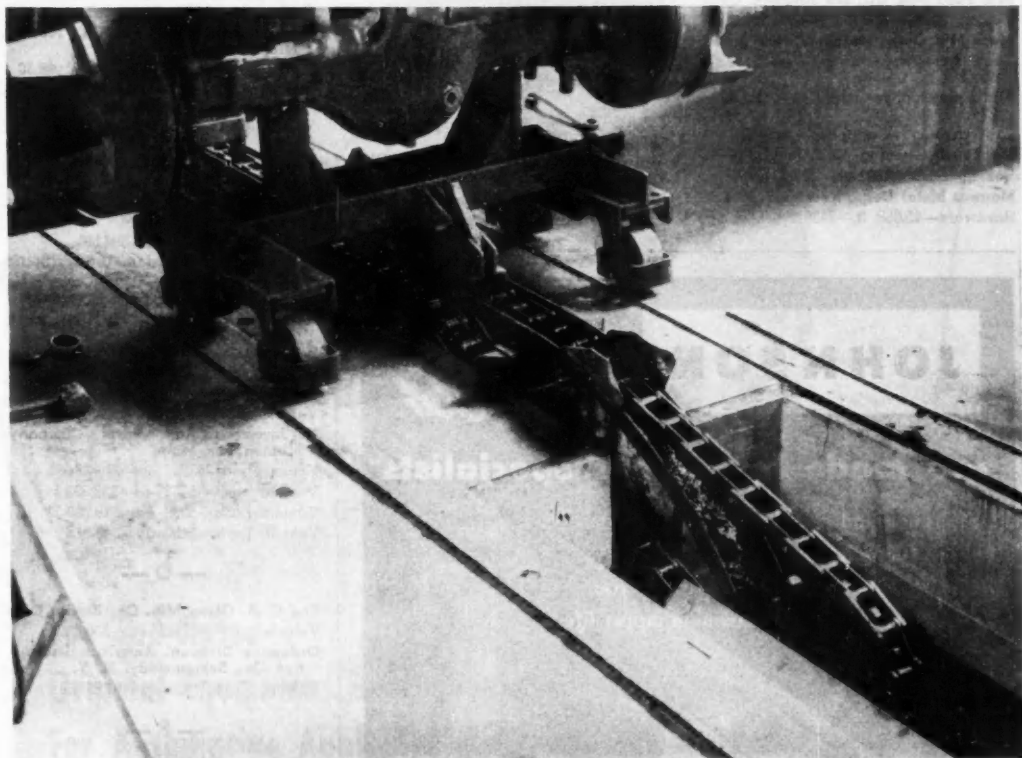
**GAS APPLIANCE SERVICE, INC.**

*Industrial Gas Engineers*

1221 WEBSTER AVENUE • CHICAGO 14, ILLINOIS



# no ONE chain serves every purpose



A 260 foot-long Link-Belt endless chain conveyor, consisting of Class C combination malleable iron and steel conveyor chain, on a motor truck assembly line. Conveyor speed is adjustable through use of Link-Belt variable speed drive.

## LINK-BELT offers the RIGHT chain for every job...engineered to meet your requirements

Typical chains from  
the complete Link-Belt line



Class H Pintle chain—  
excellent for conveyors  
that slide, because of broad  
wearing surfaces.



Class C combination  
chain—popular, durable,  
low cost design for eleva-  
tors, conveyors.



Class SS bushed roller  
chain with offset sidebars  
—for heavy drive service  
at moderate speeds.



Link-Belt "Flint-Rim" cast  
sprockets, give extra long  
life. Cast steel sprockets  
are also available for most  
severe service.

Link-Belt offers no single "cure-all" chain to handle every job. From the most complete line of chains and sprockets—we can recommend the best type to fit your particular requirements—cast, combination, forged and fabricated steel, roller or silent. So, whatever your chain problems, large or small, Link-Belt engineers will work with you or your consultants to help solve them.

**LINK-BELT COMPANY:** Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.

12,042-P

# LINK-BELT

**CHAINS AND SPROCKETS**

(Continued from page 163)

— M —

**M-D Parts Mfg. Co., Los Angeles, Calif.**  
Vehicle parts—27,000 ea—\$526,500  
**Mack Mfg. Corp., Plainfield, New Jersey**  
Tank automotive supplies—100 ea—\$26,325  
Tank automotive supplies—Job—\$32,274  
Tank automotive supplies—Job—\$56,903  
**MacKenzie Awning Co., Detroit, Mich.**  
Vehicle parts—2700 ea—\$27,534  
**Magnus Metal Corp., New York, N. Y.**  
Hardware—45,653 ft—\$430,891

**R. C. Mahon Co., Detroit, Mich.**  
Turret—60 ea—\$83,100  
**The Mansfield Tire & Rubber Company, Mansfield, Ohio**  
Tire—425 ea—\$28,674  
**Marathon Foundry & Machine Company, Chicago, Illinois**  
Vehicle parts—1100 ea—\$29,150  
**Marlin-Rockwell Corp., Jamestown, N. Y.**  
Hardware—7450 ea—\$31,828  
Hardware—3100 ea—\$25,090  
**The Master Electric Co., Dayton, Ohio**  
Motor generator set—214 ea—\$215,743  
**Mead Aviation Equipment Company, Trenton, New Jersey**

Canopy assembly—7500 ea—\$632,550  
**Milwaukee Gear Co., Milwaukee, Wis.**  
Vehicle parts—975 ea—\$63,082  
**Molded Products Corp., Chicago, Illinois**  
Fuel tank—10,000—\$1,229,480  
**Monroe Auto Equipment Co., Monroe, Michigan**  
Tank spare parts—14,664—\$448,086.30  
**The F. E. Myers & Brother Company, Ashland, Ohio**  
Vehicle parts—5750 ea—\$64,615

— N —

**National Motor Bearing Co., Inc., Redwood City, Calif.**  
Hardware—215,700 ea—\$98,061  
**National Tube Division, United States Steel Co., Detroit, Mich.**  
Hardware—194,880 ft—\$31,985  
**New Process Gear Corp., Syracuse, N. Y.**  
Vehicle parts—8000 ea—\$37,040  
**Northfield Stamping Co., Melvindale, Michigan**  
Vehicle parts—400 ea—\$34,800  
**Northwestern Auto Parts Company, Minneapolis, Minn.**  
Vehicle parts—8085 ea—\$1,077,632  
Vehicle parts—5263 ea—\$32,893  
Vehicle parts—5000 ea—\$28,700  
Vehicle parts—2450 ea—\$40,915

— O —

**The C. A. Olsen Mfg. Co., Elyria, Ohio**  
Vehicle parts—12,000 ea—\$66,000  
**Ordnance Division, American Locomotive Co., Schenectady, N. Y.**  
Vehicle parts—1320 ea—1,783,188

— P —

**Parker Aircraft Co., Los Angeles, Calif.**  
Fuel level control valves—\$75,950  
**Pastushin Aviation Corp., Los Angeles, California**  
Rework—1519 ea—\$225,632  
Tank assembly—20,000 ea—\$3,591,000  
Fuel tanks—17,950 ea—\$1,570,000  
**Pennsylvania Rubber Co., Mansfield, Ohio**  
Tire—512 ea—\$68,669  
**Perfection Stove Co., Cleveland, Ohio**  
Fuel tank—16,000 ea—\$5,958,338  
**Pesco Products, Borg Warner Corp., Bedford, Ohio**  
Spare parts—\$284,632  
Spare parts—\$60,608  
**Propeller Div., Curtiss-Wright Corp., Stamford, Conn.**  
Propeller assys—70 ea—\$299,163  
**Propeller Div., Curtiss-Wright Corp., Caldwell, N. J.**  
Spinner assy—403 ea—\$489,082  
Afterbody assy—600 ea  
Spinner assy—154 ea

— R —

**Raybestos Manhattan Inc., Manhattan Rubber Div., Passaic, N. J.**  
Aircraft hose—\$32,361  
**Reo Motors, Inc., Lansing, Michigan**  
Vehicle parts—4900 ea—\$25,613  
Vehicle parts—10,300 ea—\$44,363  
(Turn to page 174, please)

# JOHNSON

# Tappets

## are made by Tappet Specialists

Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.



**SELF LOCKING TAPPET SCREW**

Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.

"Tappets Are Our Business"

# JOHNSON PRODUCTS

INC.

## MUSKEGON, MICHIGAN

# Moraine has it! DUREX-100...

## The Top-Rated Original Equipment Bearing For Automotive Applications!

Specified as original equipment by many makers of automobiles, trucks and buses—Cadillac, Buick, Oldsmobile, G.M.C., Flxible and others—Durex-100 engine bearings have a snowballing reputation as the desired bearings for original equipment applications.

### Here's why...

Durex-100 bearings were specially developed to meet the requirements of today's high-performance engines. Modern-design engines call for a modern-design bearing such as the Durex-100—a different bearing... an advance-type bearing... with *proved* performance.

Durex-100 bearings are available *now*. For more information on this superior, up-to-date bearing, write us.

## MORaine PRODUCTS

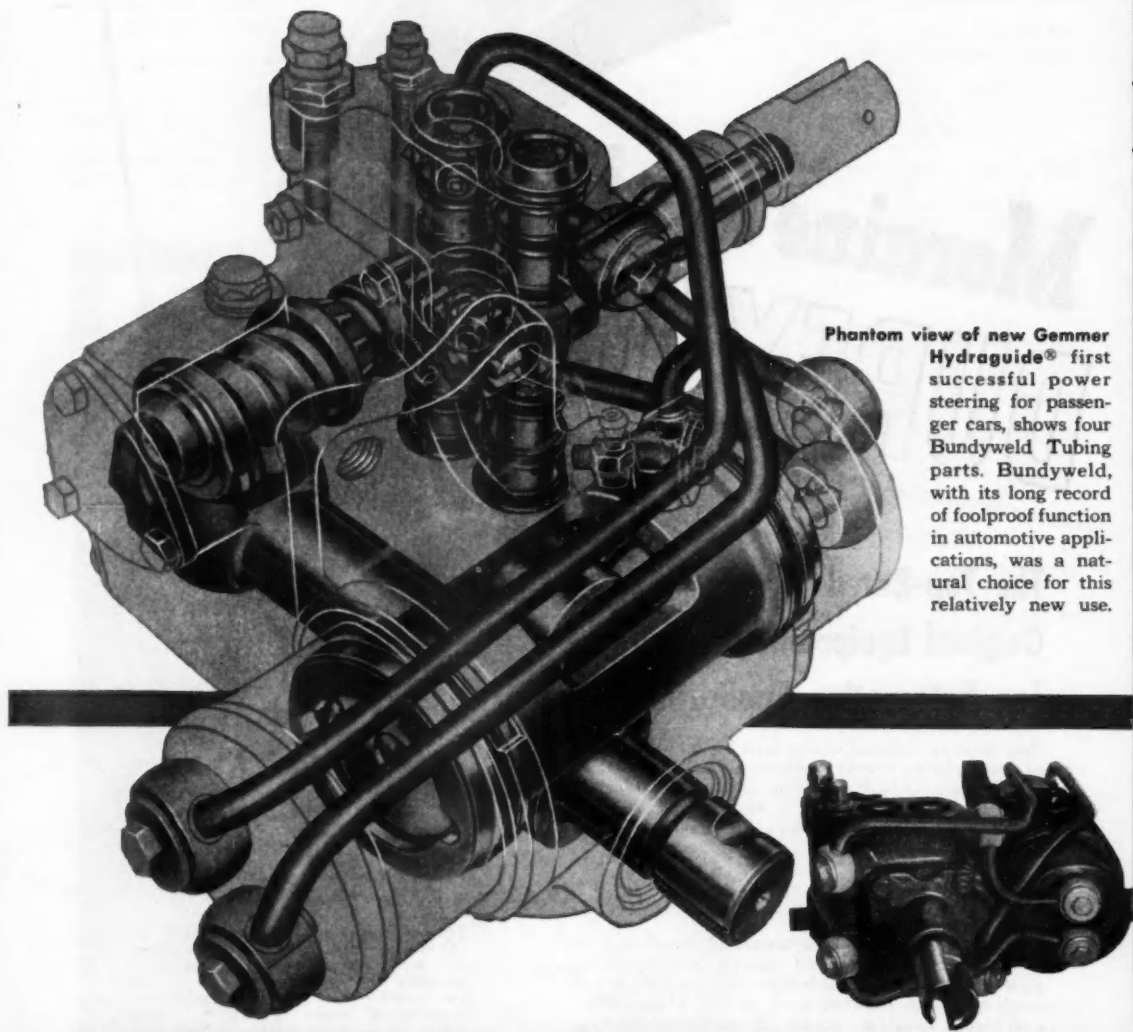
DIVISION OF GENERAL MOTORS • DAYTON, OHIO

### THE MATRIX MAKES THE DIFFERENCE

The steel-backed middle layer (or matrix) of the bearing consists of porous copper-nickel. It is firmly bonded mechanically and metallurgically with a babbit overlay to give the Durex-100 increased embedability and greater resistance to fatigue. The way it is made makes the Durex-100 different in these eight ways:

1. Greater resistance to fatigue.
2. Increased load capacity.
3. Greater conformability.
4. Better embedability.
5. Stronger bond.
6. Greater resistance to scoring.
7. Greater resistance to corrosion.
8. More durability.

# A natural for



Phantom view of new Gemmer Hydraguide® first successful power steering for passenger cars, shows four Bundyweld Tubing parts. Bundyweld, with its long record of foolproof function in automotive applications, was a natural choice for this relatively new use.

## Bundyweld Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

# power steering and for you -Bundyweld Tubing



The reasons why Gemmer Manufacturing Company of Detroit chose Bundyweld Tubing\* for their Hydraguide Hydraulic Power Steering unit are natural and logical.

**First, is performance.** Gemmer took advantage of Bundyweld's ideal properties for automotive applications: leakproof, extra-strong yet lightweight, high fatigue limit, high pressure resistance. These are the properties that have assured Bundyweld's safe, sure performance through billions of miles of motor travel.

**Second, is fabrication service.** Bundy's big fabricating facilities are devoted to:

- a. Shaving every possible fraction of a penny off per-part cost.
- b. Producing parts to exact specifications.
- c. Meeting delivery schedules right on the nose.

**Third, is engineering help.** Bundy engineers are familiar with tough tubing problems; often come up with design ideas that save on materials or fabrication costs, or improve the product's operation.

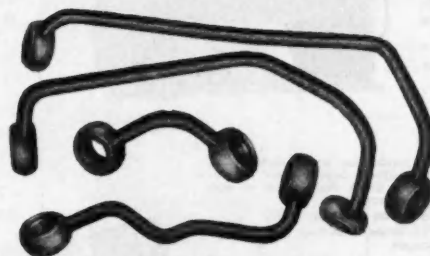
The same fine product performance and services are available to you, too. Call, write or phone us whenever you have a tubing problem.

**Bundy Tubing Company, Detroit 14, Michigan**

*\*The only tubing double-walled from a single strip with patented beveled edges.*

Gemmer Hydraguide is self-contained. It provides full time proportioned combination of hydraulic power and manual steering.

Hydraguide provides instant power response, "road feel" at all speeds; eliminates "wheel fight" caused by blowouts.



Bundy fabricates these four tubing-part components for Gemmer, ships them clean and bright on schedule. Parts are then equipped with special brazed-on fittings, given spray-paint coating, easily assembled onto mechanism.

## WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Stanley St. • Chattanooga 2, Tenn.: Fairson-Deakin Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lapham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Philadelphia 3, Penn.: Rutan & Co., 1717 Sanson St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave. South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., East • Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.



(Continued from page 170)

Kits, deep water—1938—\$95,679  
Trucks—4962—\$44,443.930  
**Republic Aviation Corp.**, Farmingdale,  
Long Island, N. Y.  
Maneuvering stabilizer—\$362,411  
Training parts—\$2,073.800  
**Rett Products Co.**, Detroit, Michigan  
Vehicle parts—300 ea—\$63,000  
**Revere Electric Mfg. Co.**, Chicago, Ill.  
Top-assembly—1260 ea—\$33,831  
**Robinson Aviation Inc.**, Teterboro, N. J.  
Mounting—2000 ea—\$205,965  
**Royal Heaters, Inc.**, Alhambra, Calif.  
Fuel tank—36,984 ea—\$11,564,896

**Rubbercraft Corp. of America, Inc.**, W.  
Haven, Conn.  
Kit-PK-2, for all aircraft—800 ea—\$46,456

# — S —

**SKF Industries, Inc.**, Philadelphia, Pa.  
Hardware—2700 ea—\$33,213  
**Scintilla Magneto Div.**, Bendix Aviation  
Corp., Sidney, New York  
Spare parts—\$64,980  
Engine analyzer—\$2,133,583  
**Seeger Refrigerator Co.**, St. Paul, Minn.  
Fuel tank—20,000 ea—\$6,280,000  
**S. A. Shenk & Co.**, Columbus, Ohio  
Vehicle parts—2500 ea—\$54,375

**Sikorsky Aircraft Div.**, United Aircraft  
Corp., Bridgeport, Conn.  
Special tools—85 ea—\$38,553  
**Skinner Purifier Div.**, Bendix Aviation  
Corp., Detroit, Mich.  
Spare parts—\$36,290  
**Stewart Warner Corp.**, Indianapolis, Ind.  
Spare parts—\$68,342  
**The Studebaker Corp.**, South Bend, Indiana  
Vehicle parts—1500 ea—\$354,630  
**The O. A. Sutton Corp.**, Wichita, Kansas  
Fuel tanks—10,680 ea—\$1,867,718

# — T —

**Thompson Prods. Inc.**, Cleveland, Ohio  
Material—\$32,035  
Valves & spare parts—\$35,703  
**Thurman Machine Co.**, Columbus, Ohio  
Vehicle parts—1200 ea—\$73,343  
**The Timken Roller Bearing Company**,  
Canton, Ohio  
Hardware—25,630 ea—\$87,605  
Vehicle parts—242,825 ea—\$121,872  
**Titellex, Inc.**, Newark, N. J.  
Harness assys.—\$161,586  
Ignition harness—4000 ea—\$444,000  
**Tool Industries, Inc.**, Detroit, Michigan  
Automotive spare parts—200—\$30,072  
**Toyad Corporation**, Latrobe, Pa.  
Hardware—12,073 ea—\$174,696  
**Trailmobile Inc.**, Cincinnati, Ohio  
Semitrailers—20 ea—\$99,353  
Airborne, air-conditioned semitrailers—  
5 ea—\$100,063  
**Trainer National Spring Company**, New  
Castle, Indiana  
Vehicle parts—19,000 ea—\$76,760  
**Triplex Corp. of America**, Pueblo, Col-  
orado  
Vehicle parts—11,600 ea—\$28,580  
**The Troy Sunshade Co.**, Troy, Ohio  
Vehicle parts—2786 ea—\$44,970  
**Truck Eng. Corp.**, Cleveland, Ohio  
Vehicle parts—26,900 ea—\$65,728  
**C. K. Turk Corporation**, Washington,  
D. C.  
Hardware—12,000 ea—\$496,100

# — U —

**United Aircraft Corp.**, Bridgeport, Conn.  
Skid installation kits, fuel  
tank installation kits—\$168,996  
CF Duck—5000 ea—\$37,750  
**United Aircraft Corp.**, Hamilton Stand-  
ard Div., E. Hartford, Conn.  
Propeller spare parts—243,301 ea—  
\$178,220  
Kit assys.—428 ea—\$179,653  
Propeller spare parts—10 kits—\$26,866  
**United Aircraft Corp.**, Pratt & Whitney  
Aircraft Div., E. Hartford, Connecticut  
Engine spare parts—23,031 ea—\$106,591  
Engine spare parts—4,690 ea—\$174,030  
Nipples for engine—18,992 ea—\$47,100  
Engine spare parts—2312—\$34,674  
Engine spare parts—132,441 ea—\$172,463  
Engine spare parts—146,949 ea—\$2,734,580  
Engine spare parts—1445 ea—\$28,953  
(Turn to page 176, please)



**ROTO-FINISH**  
gives you precision  
finishes  
mechanically...  
at lower cost



The original Roto-Finish processes can effectively convert your precision finishing operations from costly hand methods to a low cost mass production mechanical process. Only at Roto-Finish can you get the recommendations of the engineers who developed the processes for precision barrel finishing and have continued to improve them for more than a decade... results guaranteed to be the same in your plant as in our laboratory.

DW 45-36-2

HERE'S WHAT  
ROTO-FINISHING  
CAN DO  
FOR YOU

Speeds up the production and efficiency of  
descaling, and surface improvement opera-  
tions, because you finish more parts at one  
time and use less manpower.  
Cut finishing costs as much as 80%.  
Mechanically produces uniformly fine finishes  
to exact tolerances.  
Reduce maintenance expenses.

A copy of this fact-packed catalog  
is waiting for you. Write today.

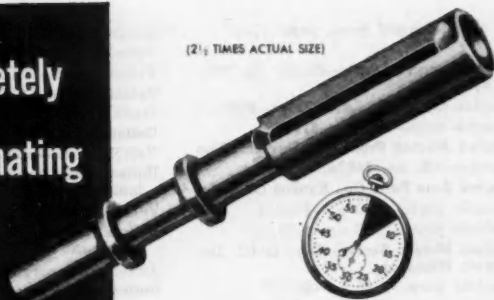


**Roto-Finish**  
associated with The Sturgis Products Co.  
3713 MILHAM ROAD, KALAMAZOO, MICH.



**COMPANY**  
P.O. Box 988 —  
Phone 3-5578

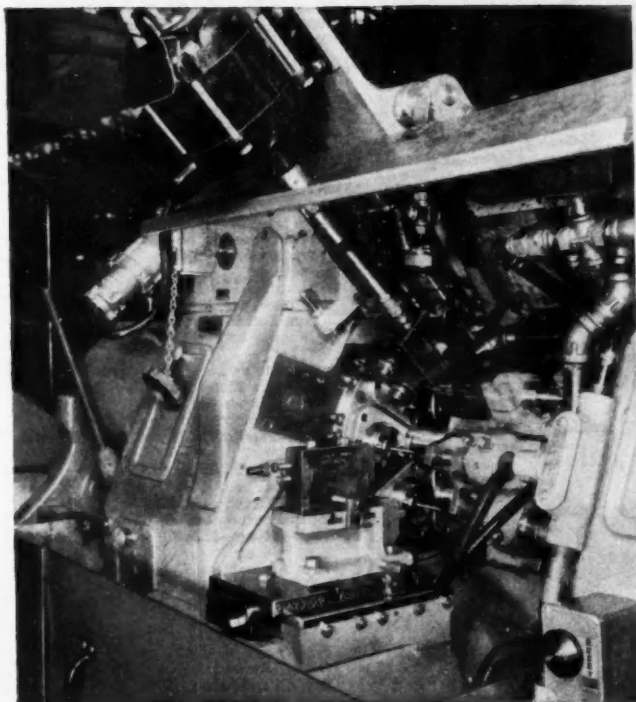
This copper alloy part completely  
machined in 7 seconds—eliminating  
3 secondary operations



(2½ TIMES ACTUAL SIZE)

(7 SECONDS)

## ACME-GRIDLEY BAR AUTOMATIC PERFORMANCE PLUS



Blanking, slotting the radius and back drilling are included in the twelve operations done by the Acme-Gridley in 7 seconds. Any one of these, done as a second operation, would take an equal amount of time.

Think of the savings in handling time, in machining time, in man-hours. And remember, these second operations can not be handled in one set-up unless the machine provides the wide, open tooling zones required for independent-power-driven auxiliaries—a feature of Acme-Gridley design.

This is no stunt job—it is typical of the savings thousands of users are making through Acme-Gridley tooling ingenuity. May we show how it can cut your costs?

### JOB FACTS

**PART**—Socket post, 17/16" long x .188" diam.

**MATERIAL**—Copper Alloy

**OPERATIONS**—12, including slot radius, pick off and back drill, concentric with front drill

**TIME**—7 seconds, complete

**MACHINE**—Acme-Gridley RA-6 Spindle Bar Automatic

# The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCK-  
ING AUTOMATICS built in 1, 4, 6  
and 8 spindle styles, maintain  
accuracy at the highest spindle  
speeds and fastest feeds modern  
cutting tools can withstand.

(Continued from page 174)

Engine spare parts—29,925 ea—\$82,459  
 Engine spare parts—18,312 ea—\$638,918  
 Engine tools—1582 ea—\$121,832  
**United Aircraft Prod. Inc., Dayton, Ohio**  
 Pumps—105 ea—\$48,147  
**United Auto Parts Co., Kansas City, Mo.**  
 Vehicle parts—5250 ea—\$25,212  
 Vehicle parts—5250 ea—\$125,212  
**United Motors Service Div., GMC, Detroit, Michigan**  
 Vehicle parts—2366 ea—\$47,437  
 Vehicle parts—73,300 ea—\$125,937

Hardware—53,000 ea—\$96,460  
 Vehicle parts—22,300 ea—\$57,893  
 Vehicle parts—2100 ea—\$25,122  
 Vehicle parts—14,800 ea—\$102,932  
 Spare parts—\$146,016  
**United Specialties Co., Chicago, Illinois**  
 Vehicle parts—2200 ea—\$96,800  
**United States Rubber Co., Fort Wayne, Indiana**  
 Vehicle parts—12,500 ea—\$1,145,000  
**United States Rubber Co., Detroit, Michigan**  
 Amphibious cargo carrier—\$35,456  
**United States Steel Co., Pittsburgh, Pa.**  
 Hardware—180 ea—\$336,832

**United States Steel Export Co., New York, N. Y.**  
 Hardware—840,000 lbs.—\$34,440  
**Universal Products Company, Inc., Dearborn, Michigan**  
 Vehicle parts—3000 ea—\$54,050  
 Vehicle parts—12,000 ea—\$40,680

— V —

**Vickers Incorporated, Detroit, Michigan**  
 Spare parts—\$28,460

— W —

**Wagner Electric Corp., St. Louis, Mo.**  
 Vehicle parts—40,000 ea—\$51,680  
 Vehicle parts—33,000 ea—\$106,890  
**Ward La France Truck Corp., Elmira, New York**  
 Vehicle parts—1,600 ea—\$49,408  
 Vehicle parts—1500 ea—\$27,883  
 Vehicle parts—600 ea—\$94,550  
 Vehicle parts—200 ea—\$63,246  
 Vehicle parts—135 ea—\$113,192  
**Warner Gear Div., Muncie, Indiana**  
 Vehicle parts—3000 ea—\$13,740  
 Vehicle parts—28,500 ea—\$65,625  
**Waukesha Motor Co., Waukesha, Wisc.**  
 Spare parts—\$75,778  
 Spare parts—\$29,708  
 Spare parts—\$29,113  
 Spare parts—\$38,527  
**Weber Aircraft Corp., Burbank, Calif.**  
 Spare parts—\$35,486  
 Seat assemblies—51 ea—\$153,732  
**Weibull Stove Co., Inc., Maspeth, N. Y.**  
 Tank—1712 ea—\$582,080  
 Tank—4264 ea—\$1,459,760  
**Western Electric Co., New York, N. Y.**  
 Auto transformer and mounting-modification—193 ea—\$49,735  
 Kit—100 ea  
**Westinghouse Electric Corp., Dayton, Ohio**  
 Auto-transformers—29 ea—\$111,662  
 Alternators—253 ea—\$335,358  
 L-1 voltage regulators—246 ea  
 Generators—4166 ea—\$1,793,195  
 Generators—80 ea—\$114,931  
**Westinghouse Electric Corp., Aviation Gas Turbine Div., Philadelphia, Pa.**  
 Jet engine spare parts—749 ea—\$1,319,723  
 Jet engine spare parts—7149 ea—\$81,713  
**The White Motor Co., Cleveland, Ohio**  
 Truck—228 ea—\$1,099,180  
 Spare automotive parts—\$95,439  
**Willis-Overland Motors, Inc., Toledo, Ohio**  
 Vehicle parts—8500 ea—\$111,971  
 Truck—367 ea—\$491,376  
 Truck—467 ea—\$682,669  
 Vehicle parts—6000 ea—\$54,720  
 Truck—44 ea—\$229,029  
 6 ea  
**Wire Assemblies Corp., Detroit, Mich.**  
 Vehicle parts—9350 ea—\$70,434  
**Wisconsin Motors Corp., Milwaukee, Wisconsin**  
 Maintenance parts—93 ea—\$59,934  
 Spare parts—Lot—\$51,315  
**Wright Aeronautical, Curtiss Wright Corp., Wood-Ridge, N. J.**  
 Special engine tools—50,000 ea—\$1,805,000  
 Engine crankshafts—605 ea—\$436,023

— Y —

**Youngstown Steel & Tube Co., Youngstown, Ohio**  
 Hardware—1,030,000 lbs.—\$47,895

— Z —

**Zenith Carburetor Div., Bendix Aviation Corp., Detroit, Mich.**  
 Vehicle parts—21,590 ea—\$56,814

# Lamb Electric

SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER

## GEAR MOTORS

bring to your product—

- LOW SPEED
- HIGH TORQUE
- COMPACTNESS
- DEPENDABILITY
- LOW WEIGHT

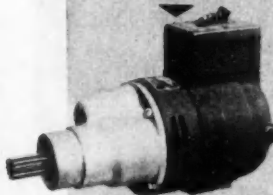
Many years of specialized experience in the design and manufacture of gear motors combined with the finest gear cutting equipment assure outstanding performance in Lamb Electric gear motors.

All Lamb Electric Motors are specially engineered for the product, which usually results in savings in space, weight and cost factor.

THE LAMB ELECTRIC COMPANY  
KENT, OHIO

In Canada: Lamb Electric — Division of  
Sangamo Company Ltd. — Leaside, Ontario

Geared head motor with  
severing switch, adaptable  
to many heavy-duty, slow-  
speed applications.



Electrically governed,  
precision-built motor with  
accurate speed adjustment.  
Ideal for instrument use.



THEY'RE POWERING AMERICA'S *Finest* PRODUCTS

# Lamb Electric

SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER MOTORS



## ALLEN SCREW ... SOCKET SCREW

*mean the same thing everywhere!*

Although *Allen O Screw* is not in the dictionary, engineers and production men the world over say *Allen O Screws* to refer to *precision socket screws*. That's how it is with names — probably there's a name that comes to your mind at once as an outstanding *Industrial Distributor* in your locality. He is almost certain to be the one who handles *Allen O Screw* products. His experience and extensive stock of *Allen O* products are the ideal combination to smooth out any problems you encounter in precision fastenings.

THE BUY WORD IN SOCKET SCREWS IS ALLEN





## Industry News

(Continued from page 23)

### Escape Cockpit Shields Pilot From Supersonic Airstream

A new "ball out" cockpit capsule which provides jet pilots with a safe means of emergency escape at supersonic speeds has passed its preliminary tests and is now ready for use. The Navy Bureau of Aeronautics unveiled the protective device recently

at the Douglas Aircraft Co. El Segundo plant where the escape cockpit was developed for the Navy.

When a pilot finds it necessary to abandon his plane, he touches off a rocket charge which expels the entire cockpit clear of his craft. Three fins unfold at the aft end to stabilize the capsule and a small parachute pops out to slow down its forward speed. When a safe speed is reached, a main parachute lowers the cockpit gently to the earth.

The entire cockpit capsule is sealed

and pressurized to protect the pilot against fatal atmospheric conditions prevailing at altitudes above 50,000 feet. In the event of a water landing, the capsule will float, with the storage battery of the mother plane acting as a weighted keel to keep it upright. Wave motion pumps fresh air into the sealed and insulated compartment.

Final tests were conducted on the 10,000 foot aero-ballistic track at Naval Ordnance Test Station, Inyokern, Calif. to determine if the cockpit could be ejected satisfactorily at the speed of sound near sea level. Fitted to a test rig simulating the forward part of a fighter airplane, the capsule was catapulted down the track by two successive stages of rocket propulsion. Engineers believe the apparatus may have traveled at faster speeds than land vehicles have attained previously—close to 760 mph. After the apparatus sped down the track several thousand feet, the cockpit capsule ejection charge was automatically ignited, fins snapped open and it remained stable on its flight to the earth.

Navy officials said the principles utilized in the development of the compact cockpit capsule can be applied advantageously to all aircraft cockpits.

## Dependable—every one!

### Quality Control does it!

Modern statistical Quality Control procedures hold Tung-Sol Lamps to the highest standards of uniformity. To Tung-Sol customers, Quality Control is reflected in performances that exceed specifications and in the virtual elimination of production line rejects. You can count on Tung-Sol quality and Tung-Sol service.

TUNG-SOL ELECTRIC INC.  
NEWARK 4, N. J.

Sales Offices: Atlanta, Chicago, Culver City, Dallas, Denver, Detroit, Newark, Philadelphia

#### TUNG-SOL MAKES:

All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Picture-Tubes, Radio, TV and Special Purpose Electron Tubes.

**TUNG-SOL®**  
**AUTO LAMPS**  
*Dependable!*



### Extensive Car Literature Collection is Offered

The American Library Service, 117 W. 48th St., New York 36, N. Y., has announced the availability of a collection of 60,000 items covering the development of the automobile. Sales literature, instruction books, photographs, periodicals, and books are included in the indexed collection.

ALS has expressed a willingness to sell the collection at a fair price to an individual or group for eventual donation to a library for the use of those engaged in automobile industry research. A comprehensive group of automobile posters is also available.

### Mathematical Aid Is Now Available

An organization called Mathematical Computing Service has been formed to specialize in performing certain engineering services for industries and institutions. The firm will provide engineering calculations, charts, and nomographs of a complex nature and will treat related mathematical problems in the field of automotive engineering. Address of the new firm is 105 Court St., Brooklyn 2, N. Y.

(Turn to page 180, please)



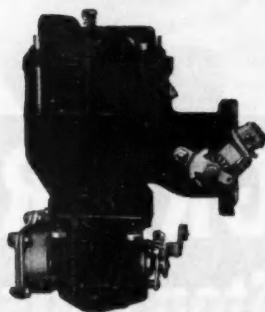
Will he Buy Your Truck Next Time?



IT ALL DEPENDS  
ON PERFORMANCE  
and  
PERFORMANCE  
DEPENDS ON

# Zenith

CARBURETORS



No manufacturer could long exist in the competitive commercial vehicle field without drawing heavily on previous owners for new vehicle sales. It is perfectly obvious, no owner would buy the same make vehicle again and again unless it has delivered satisfactory performance. Therefore, it is just good business to see that every component contributes its share toward building owner loyalty. That's why manufacturers whose vehicles are Zenith\* equipped measure carburetion costs in lasting terms rather than initial expense. In the field of heavy-duty carburetion, one name, Zenith, has stood for lasting satisfactory performance for over a quarter of a century. Zenith's rugged construction, strong idling, freedom from stalling and response to every demand make it the engineers' choice. For good will, it's good business to specify the best—Zenith for lasting performance.

\*U.S. PAT. OFF.

## ZENITH CARBURETOR DIVISION OF

696 Hart Avenue • Detroit 14, Michigan



Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

made by  
to insure

**MASTER**

**SERVICE PARTS**



**WATER PUMPS**

Lifetime-lubricated bearings. Patented long-life seals. Vacuum-tested.

**CLUTCH  
RELEASE  
BEARINGS**

Finest materials and workmanship assure less friction, longer wear.



**TIE ROD  
ENDS**

Four ways better!  
Rolled Threads,  
Phosphor Bronze Seat,  
Patented Ball Bearing  
Construction, Neoprene  
Washer and Dust Shield.

**OTHER MASTER BRAND  
QUALITY PRODUCTS**

Front End Suspension Parts • King  
Bolt Sets • Front Wheel Bearings  
Hydraulic Brake Parts • Hydraulic  
Brake Hose • Stop Lite Switches  
Fuel Pumps Parts and Distributors

WRITE FOR CATALOGS!  
**CHEFFORD MASTER  
MANUFACTURING  
COMPANY, INC.**

Fairfield, Illinois

## Industry News

(Continued from page 178)

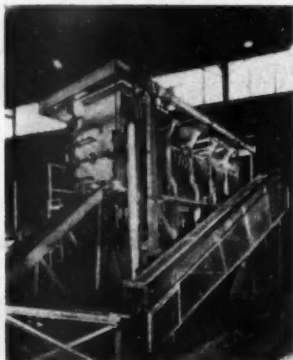
### Air-Mobile Fuel Tank Being Tested For Army

Tests are being run at Ft. Lee, Va., on two experimental models of a new 800-gal mobile fuel tank intended as an auxiliary unit of petroleum supply to be moved by land or air.

Each unit is 13½ ft long, 6½ ft high, and weighs 4500 lb, empty. It consists of an aluminum fuel tank, weighing 1650 lb, and a pneumatic-tired chassis designed for rough travel.

A quick-clamping device fastens the tank to its chassis. Twelve small wheels on each side of the tank facilitate loading aboard aircraft. Tanks from two or more units may be stacked for transport, or the entire unit, including chassis, may be moved by plane.

Quartermaster supply companies are expected to find the mobile unit an effective means of increasing the amount of petroleum that can be delivered to combat and supporting forces by vehicle.



### SIMPLIFIED GAS FURNACE

Automobile steering knuckle support arms and ring gear forgings are produced in a gas-fired Surface Combustion Corp. furnace. Work handling during high-speed billet heating for press forging has been reduced by a series of chain conveyors.

### Rubber Products Maker Moving to New Plant

The Yale Rubber Manufacturing Co. will begin operations on Oct. 1 in their new \$1 million plant at Sandusky, Mich., which will more than double the firm's previous production capacity. The company makes industrial rubber products and rubber-metal bonded parts.

(Turn to page 182, please)

**ANCHORED  
FOREVER**

## .. or Released in an Instant



CLINCH TYPE



INSTRUMENT  
MOUNTING



SPRING TYPE



THIN TYPE



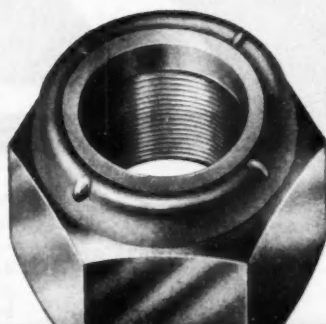
STANDARD

Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

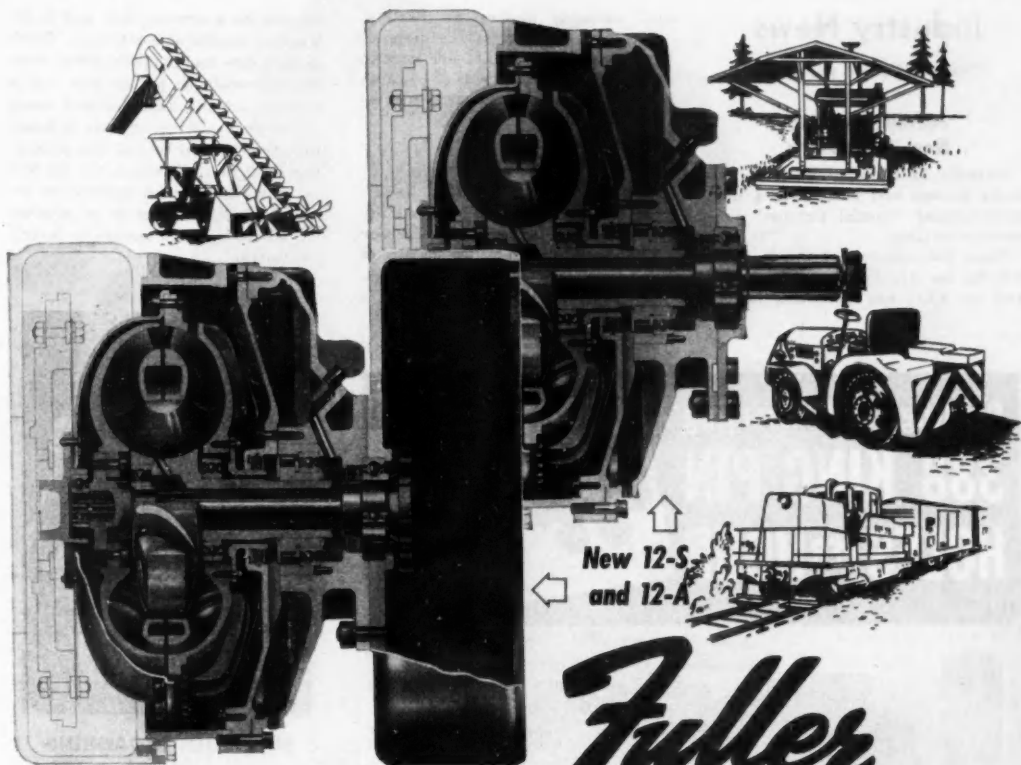
Bolt threads are gripped tightly . . . these famous nuts never work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOLD collar does it . . . and seals against fluid leakage, too!

Solve your fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

Write  
**GREER STOP NUT CO.**  
2620 Flournoy, Chicago 12, Ill.



**GREER  
Stop Nuts**



# Fuller Torque Converter Couplings

Designers now have at their command a new torque converter coupling for engines delivering maximum torque of 180-225 foot pounds. Fuller's new 12-A and 12-S converter coupling drives have proved highly successful in delivery trucks, fork-lift trucks, tow trucks, hoists, locomotives, loaders and other installations where start-and-stop, heavy load pickups are hard on engine, gears, drive lines, axles and tires, and tiring on operators.

Design these advantages into your new equipment.... 2.1 to 1 torque multiplication.... elimination of shock loads and stall-

ing.... greater operator ease.

Available with *splined* output shaft (12-S) or with *flanged* output shaft and SAE No. 3 flywheel housing (12-A). Multiplication 2.1 to 1 at stall for smooth starting and hard pulling. Stator mounted on over-running clutch which permits automatic change to fluid coupling operation for economy in normal running. Maximum diameter of fluid circuit 12 $\frac{3}{4}$ ". Designed for engine speed of 2000-2200 and higher.

Ask for an analysis by our engineering department for your application, giving engine torque and hp. curve.

- SPEEDS WORK
- SMOOTHS POWER
- PREVENTS SHOCK
- PLEASES OPERATORS
- PRESERVES EQUIPMENT



**FULLER MANUFACTURING COMPANY** (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif. \*

## Industry News

(Continued from page 180)

### Battelle Building New Laboratory

Battelle Institute, Columbus, O., broke ground last month for a new million-dollar "special purpose" laboratory building.

Some 300 industrial firms, in addition to the Air Force, Army, Navy, and the AEC, are sponsoring impor-

tant research studies at Battelle.

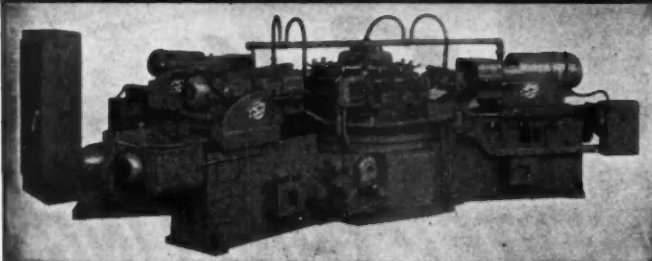
The new building will be designed to minimize vibration, to aid work in electronics and other fields of research where delicate measurements are essential.

### Buick Undecided On Sports Car

Buick Div. of General Motors Corp. has not made any definite decision yet about going into production of its sports car, called the Skylark. The car is being shown around the

country on a pretest basis and is attracting considerable attention. Buick dealers have had inquiries about when the car would be put on sale, and a number actually have accepted retail orders on a contingent basis in hopes that the car will be put into production next year. However, the car will be shown for several months yet before any decision is made on whether the market is large enough to justify production.

Drilling and Reaming  
**388 KING PIN  
HOLES PER HOUR**



Station Type Indexing Machine for drilling and reaming king pin holes.

### On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION INDEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

1. Drill 53/64" dia.—Half way through.
2. Drill .823" dia.—Balance of way through.
3. End Cut Ream .8547/.8550" — Full length of hole.
4. Finish Ream .8635/.8637"—Full length of hole.
5. Load and Unload.



**Davis & Thompson Company**

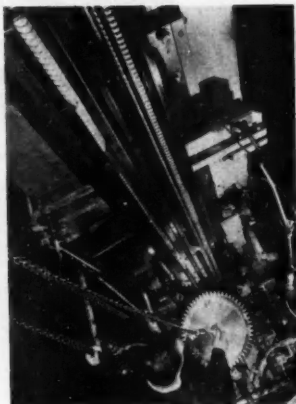
6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

### 4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

### Free Data

Will be furnished on request.



### MAMMOTH BROACHING UNIT

A broaching machine, 14 ft high, cuts triangular slots into a turbine disc of a jet engine at Pratt & Whitney Div. of United Aircraft Corp. with a single strike. Jet turbine blades are seated in the slots made in the disc.

### New Rocket Plant For Aerojet

A new rocket production facility on an 8400-acre site near Sacramento, Calif., has been announced by the Aerojet Div. of The General Tire and Rubber Co. The new plant will produce ordnance rockets, JATO's, guided missile boosters, and missile power plants.

The research, engineering, and metal parts fabrication divisions of Aerojet will remain at the company's Azusa plant.

### Gabriel Establishes Laboratories Div.

Gabriel Co. has announced the establishment of Gabriel Laboratories as a separate division of the company. The laboratories will serve as the research and development center for all Gabriel divisions, both automotive and electronic.

(Turn to page 184, please)





## No MYSTERY



Clearing presses are much in evidence in the Kaiser-Frazer Shadywillow plant, opened some months ago in the Wheeling area.

The one in the photo is part of a line of four Clearings forming a production group in the new plant.

Kaiser-Frazer knew exactly what they were doing when they chose these Clearing presses. You see, there are Clearing presses in the parent plant at Willow Run, and they've been on the job there for quite a while.

### **CLEARING MACHINE CORPORATION**

6499 WEST 45TH STREET • CHICAGO 38, ILLINOIS  
HAMILTON DIVISION, HAMILTON, OHIO

# CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION



## BROKEN TAPS

# Removed!

## TOOL & DIE Repairs!

### REPORTED:

\$70,000.00 in savings every year in Tool and Die Repair alone from only two Thomas Metalmasters in the world's largest cash register manufacturing plant.

### REPORTED:

Terrific drop in scrap loss per man from \$35.00 per man to \$8.00 per man with the use of 14 Thomas Metalmasters in the world's largest Aircraft engine manufacturing plant.

With the Thomas Metalmaster Disintegrator you'll actually remove broken tap cores in minutes with no fuss—no bother—no toil... PLUS the fact that you'll not injure or effect the temper of the workpiece.

For technical information relative to metal disintegration via the TM way send for your copy of the Thomas Metalmaster Technical Bulletin published monthly in the interest of metal disintegration advancement. This is the only complete and reliable source on metal disintegration available in the world. Direct reports monthly of our findings and advancements right from our own complete Research Laboratories.

Write today on your company letterhead to:

**METALMASTER**  
DIVISION OF THE CLINTON  
MACHINE COMPANY  
CLINTON, MICHIGAN

There's a factory trained technical engineer in your area ready to give you a free demonstration in your own plant.

## Industry News

(Continued from page 182)

### Boeing Delivers New Transport to USAF

The first of a new, improved type Boeing Stratofreighter, designated KC-97F, has been delivered to the U. S. Air Force, Boeing Airplane Co. announced recently.

The double-deck Stratofreighter, first in a new series under construction as multi-purpose cargo and troop transports, is the tenth model in the C-97 family.

The new Wasp Major engines of the KC-97F, known as R-4360-59's, have redesigned cylinder heads, crankcase, crankshaft, exhaust manifold, and ignition system. Bendix-Scintilla ignition analyzers also are being fitted to the new airplanes.

### Huge Centrifuge Installed at Naval Acceleration Unit

Said to be the world's largest and most powerful, a machine to subject pilots to extreme gravitational conditions encountered in sonic-speed aircraft has been put into operation at the Naval Aviation Medical Acceleration Laboratory, Johnsville, Pa.

Built by the McKiernan-Terry Corp., and powered by a General Electric Co. motor, the centrifuge is reportedly capable of accelerating from a dead stop to 173 mph in less than seven seconds. It will speed up from zero to approximately 90 mph in 1 1/2 seconds.

### Alcoa Plans to Build Facilities in Alaska

Aluminum Co. of America will undertake the construction of a 400-million-dollar aluminum smelting project in Alaska as soon as the necessary land can be purchased and Government approvals obtained, the company announced recently.

The project reportedly would initially be capable of producing 200,000 tons of aluminum annually. Smelting facilities, and electric power developments necessary to operate them, would be situated in the Taiya Valley district, near Skagway, Alaska. Financing of the project would be done with private capital.

### Industrial Teamwork Theme of New Film

An interesting Technicolor film entitled "American Harvest" was pre- (Turn to page 186, please)



# CHECK

### Shaped Wire\*

- Flat
- Round
- Odd contour

Low or high carbon, stainless, special alloy, Armco. You draw the shape—PAGE can draw the wire.

### Armature Banding Wire

Tinned stainless or carbon steel. In reels of 50 to 200 pounds. Stainless has high tensile strength, high resistance, low permeability.

### Lock Safety Wire

Tough, durable, workable. In the size and type for your work.

### Spring Wire

Any shape\*... high carbon... hard drawn... high tensile... stainless... galvanized... tinned... bright.

\*Cross-sectional areas up to .250" square; widths to 3/4"; width-to-thickness ratio not exceeding 6 to 1.

### YOU do this—

Give us the specifications of the wire you need—or tell us details of job to be done.

### WE'LL do this—

Send our recommendations, prices and delivery date. Samples on request. PAGE offers you a wide variety of wires to choose from.

Wire or  
Write Today

## PAGE WIRE

ACCO



PAGE STEEL AND WIRE DIVISION  
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

# Globe-Union Posts

help make your customers "battery happy"

**"NONSPILL" safety vents** prevent acid spilling over — protect adjacent vehicle parts.

**PEBBLED SURFACE** and staggered construction of interlocking Y-shaped grid bars hold superactive oxides in place — assure longer life.

**HIGH-POROSITY** separators permit quick release of power.

**CHEMICALLY SET** plates promote more power, prolong battery performance.

**ONLY GLOBE BATTERIES** have rubber bushings on all posts — sealing covers for the life of the battery.

This shock-proof construction eliminates cover breakage and chipping away of sealing compound . . . avoids snapping of terminals. Exclusive design permits use of full-size posts below the cover. Plate life is extended because of reduction of vibration — assuring GLOBE customers of the most for their battery dollar.

If it's engineered and made by Globe Union—it's **RIGHT FROM THE START**

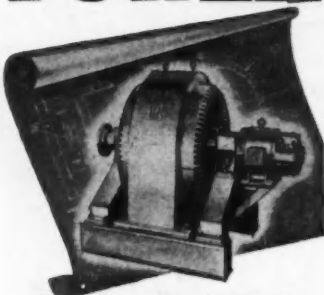
Globe-Union builds quality batteries for original equipment and for mass merchandising under the trade names of GLOBE SPINNING POWER and leading private brands.

**GLOBE-UNION**

## GLOBE-UNION INC. MILWAUKEE 1, WISCONSIN

Battery Production Plants At: ATLANTA, GA. • BOSTON, MASS. • CINCINNATI, O. • DALLAS, TEXAS • EMPORIA, KANS. • HASTINGS-ON-HUDSON, N. Y. • LOS ANGELES, CALIF. • MEMPHIS, TENN. • MINERAL RIDGE, O. • OREGON CITY, ORE. • PHILADELPHIA, PA. • REIDSVILLE, N. C.

for  
custom-engineered  
**POWER**



look to... **EP**

Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency changers.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

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PRODUCTS COMPANY.**



17250 CLARKSTONE ROAD  
CLEVELAND 12, OHIO

Attach coupon to your  
letter head for your copy  
of Bulletin 2-200

NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_  
X-14

## Industry News

(Continued from page 184)

viewed recently by Chevrolet Div. of General Motors Corp. The film is ready for distribution within the trade and to other organized groups.

Running 29 minutes, "American Harvest" portrays a panorama of industrial activity in the USA. The central theme shows the teamwork of people all over the country—on farms, in the mines, on the prairies, in textile mills, the oil fields, and in the factories—that joins in the making of the motor car, truck, and bus.

### Improved Aviation Gas Is Requested by PAD

The Petroleum Administration for Defense has asked refiners to do as much as possible to improve the quality of base stocks of aviation gasoline. These are reported by the agency to be in short supply.

High-quality automotive gasolines, a substantial part of the base stocks, are now being blended with alkylate and other components to produce gasoline at below a blending index number of 90. If a portion of these



### ELEVATED LINE

P2V Neptune anti-submarine planes for the Navy are being built on this elevated assembly line at Lockheed Aircraft Corp. Attached to wheeled frames riding on raised tracks, fuselage structures can be easily rolled from station to station. Electricity and air lines under tracks supply power for tools.

base stocks could be replaced with higher-quality material, according to the agency, aviation gasoline output could be expanded because less alkylate, also said to be in short supply, would be required.

## Serving INDUSTRY since 1887

## WASHERS and STAMPINGS

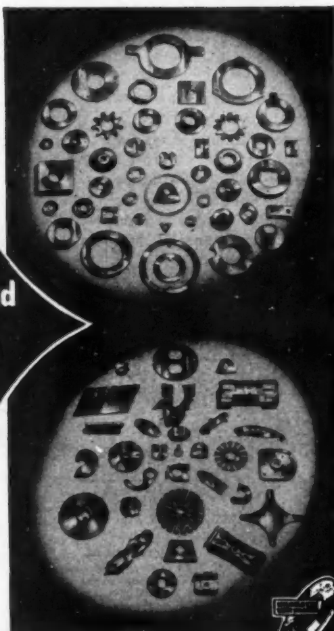
Standard and Special Washers, of every description, from every kind of material, any desired finish . . . designed for every purpose . . . utilizing more than 22,000 Sets of Dies.

Let us Quote on Your Needs.

**WROUGHT WASHER MFG. CO.**  
THE WORLD'S LARGEST PRODUCER OF WASHERS

2212 SOUTH BAY STREET

MILWAUKEE 7, WISCONSIN



# FIXTURES

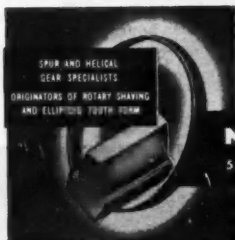
Because the fixtures so often determine the speed and economy of broaching operations, it is just "good business" to entrust their design to specialists of proven experience and ability in the broaching field. Manufacturers, high production and job lot, depend on Red Ring broach engineers to develop their tooling.

Illustrated here are some of the fixtures used to produce the reverse brake band anchor, an element of a modern automotive torque converter. Of the 7 machining operations on this part, 5 are broaching.

Ask Red Ring broach engineers for suggestions on your tooling.

*Reverse brake band anchor forging*

*Finished work part*



**NATIONAL BROACH & MACHINE CO.**

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



# Do up to 80% of your

## STANDARD CARBOLY TOOL PRODUCTION TIPS

**1.** A large radio manufacturer solved several of its trickiest, toughest automatic screw-machine problems by ignoring accepted practices and switching from steel tools to cemented carbide tools. First, a modified Standard Carboly Tool (Grade 883 carbide tip) is used to turn B-1113 steel. Finish and accuracy are exceptional—and tool life is extended to 50 to 60 hours of continuous production.

Second, high-speed steel tools failed completely on the cut-off job when positions were decreased from 3 to 2, and feed was increased from .0024" to .0037". Again breaking with tradition, this manufacturer cuts the B-1113 steel to dead center with Standard

Carboly Tools using Grade 883 tips.

**2.** A large motor-car company now performs nine roughing operations simultaneously on a 13½" O.D. cast aluminum converter pump with a special tool head incorporating modified Standard Carboly Tools. The operation consists of 9 cuts—3 facing, one boring, 3 combined boring and facing cuts, and 2 combination facing and chamfering cuts.

Total feed is .012" per revolution. Cutting speeds range as high as 3400 SFPM, spindle speed 800 rpm. Output per machine per hour is tripled.

If these cemented carbide applications suggest Standard Carboly Tool uses you would like to explore further, please get in touch with your Carboly representative.



# single-point 11 Standard

# machining with Carboloy Tools

**11 Standard Carboloy Tools** will do up to 80% of all your single-point turning, facing and boring ... eliminate hundreds of costly, inventory-loading special tools.

What's more, fast-cutting Standard Carboloy Tools boost production as they chop tool and maintenance costs. *This has been proven in all types of shops on an industry-wide basis.* Tipped with the quality brand of cemented carbides, Standard Carboloy Tools easily outproduce and outlast steel tools by as much as 10 to 1 or more.

### Cut faster, better, for less

Why not test Standard Carboloy Tools on your toughest job? Prove for yourself that whether used "as is" or quickly and economically ground to special shapes in your own toolroom, Standard Carboloy Tools will do your single-point machining jobs faster, better, for less.

And don't overlook the plus-values in Standard Carboloy Blanks. They're available in many styles; mass-produced at low cost in hundreds of sizes. They're easily brazed to tool shanks to handle those emergency jobs, without time or money wasted waiting for specials.

### Extra carbide benefits

Carboloy-Developed Services lead to more efficient selection, design, use and maintenance of cemented carbide tools, result in extra carbide benefits. Services include Customer Training School, technical manuals, charts, catalogs, low-cost slide films ... and on-the-job assistance of skilled Carboloy engineers to crack specific carbide problems.

Write for complete Carboloy General Tool Catalog, GT-250, or contact your local Carboloy Sales Engineer or Authorized Distributor today.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

**CARBOLLOY**  
DEPARTMENT OF GENERAL ELECTRIC COMPANY

11151 E. 8 Mile Blvd., Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, N.Y.

### NOTE:

*Magnet ideas to speed up general shopwork*

See how Carboloy Permanent Magnet Sheet-Steel Separators prevent feeding of doubles. How permanent magnets give an extra "hand" in general shop work, including ... magnetic stands, tool-holding

devices, sweepers' pick-up tools, magnetic paper grippers on machines, containers for small parts and magnetic retrievers. (Write for Carboloy Magnet Ideas Kit, PM-102.)

**If you have an  
AUTOMOTIVE  
PROBLEM**  
*in production,  
assembly, packaging,  
shipping*



**You can save time  
and money with  
the proper use of**



**SEAMLESS  
F.O.S.  
INDUSTRIAL  
TAPE**

For masking, hold-  
ing, packaging,  
backing, hinging,  
protecting, rein-  
forcing, identify-  
ing, splicing,  
sound-proofing, insulating, stenciling,  
bundling, sealing, binding



**USE SEAMLESS  
F.O.S. Industrial Tape**



**Call or Wire**

collect for authoritative  
advice and suggestions.  
Prices, catalogues, sam-  
ples on request. Tape to  
meet govt. specifications.  
Wire details collect for 24-  
hour reply.

"Originators of  
Pressure-Sensitive  
Industrial Tapes"



WIRE INDUSTRIAL TAPE DIV. E  
**THE SEAMLESS RUBBER  
COMPANY**  
NEW HAVEN 3, CONN., U. S. A.

## BOOKS...

**SELLING TO INDUSTRY**, by Bernard  
Lester, The Industrial Press, 148 Lafayette  
St., New York 13, N. Y. Price, \$3.50.  
This is a compact, pocket-size book that  
has been written as a manual of practical  
ideas and suggestions for the sales engi-  
neer who wants to analyze and improve  
his methods of finding, contacting, selling  
and servicing industrial customers. In  
this manual Mr. Lester has set forth in a  
brief and realistic way those key points  
which have, from experience, been found  
to be most effective.

**BUTANE-PROPANE POWER MAN-  
UAL**, published by Butane-Propane News,  
Los Angeles, Calif. Price, \$3.50. This  
book gives step-by-step directions for con-  
verting gasoline engines to butane-propane  
carburetion. It has the complete story of  
L.P. gas carburetion principles and equip-  
ment—from the tools needed to sales  
hints for getting and handling this profit-  
able business. The 320-page manual is  
written in six sections and 23 chapters  
which cover the basic facts of fuel and  
power, carburetion, conversion, service ad-  
justments, maintenance and trouble shoot-  
ing, and how to sell L.P. gas carburetion.

**MATHEMATICAL ENGINEERING  
ANALYSIS** by Rufus Oldenburger, pub-  
lished by The Macmillan Co. In this text  
the author reasons that to operate at  
maximum efficiency the man in charge  
of industrial research must be capable of

setting up experimental problems in  
mathematical form so as to determine  
when something can be done more eco-  
nomically by mathematical computation  
than by experimentation. Objective of this  
book is to develop the basic laws of en-  
gineering from a minimum number of  
assumptions so as to provide a logical  
physical and mathematical picture of  
fundamental concepts. It is of interest  
that the text is an outgrowth of courses  
given by the author at the Illinois In-  
stitute of Technology and De Paul. The  
text covers the gamut of engineering  
knowledge from studies of mechanics, elec-  
tricity and magnetism, to heat, elasticity,  
and fluid mechanics. That this is thor-  
oughly up-to-date coverage may be judged  
from considerations of problems of gas  
turbines, turbine blading, and aircraft.

### Honeywell Gets Order For Helicopter Autopilot

The Air Force has awarded Minne-  
apolis-Honeywell Regulator Co. a  
\$4.5 million order for a newly de-  
veloped automatic pilot for helicop-  
ters.

Perfected by the company's Aero-  
nautical Div. in cooperation with the  
Air Force and the Piasecki Heli-  
copter Corp., the new autopilot is ear-  
marked for use in the H21 Piasecki  
helicopter.

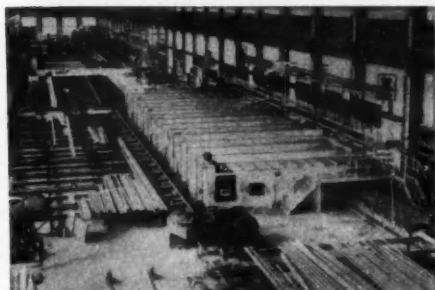
for  
HOMOGENIZING  
SOLUTION TREATING  
AGING  
BILLET HEATING  
BRAZING  
FINISH ANNEALING  
OR ANY OTHER  
PROCESS

There's an

**EF**

**furnace to handle any  
product or production**

• Our wide experience in the processing of aluminum, mag-  
nesium and other non-ferrous and ferrous products can save  
you time and money. We build continuous and batch type  
furnaces,— gas fired, oil fired or electric . . . whichever is best  
for your particular requirement — furnished complete with all  
necessary charging, discharging, quenching, special atmos-  
phere and special handling facilities. For long, efficient,  
trouble-free service, let EF engineers work with you on your  
next furnace problem.



Completely Automatic EF Furnace Heats and Quenches  
Aluminum Shapes up to 90 Feet Long.

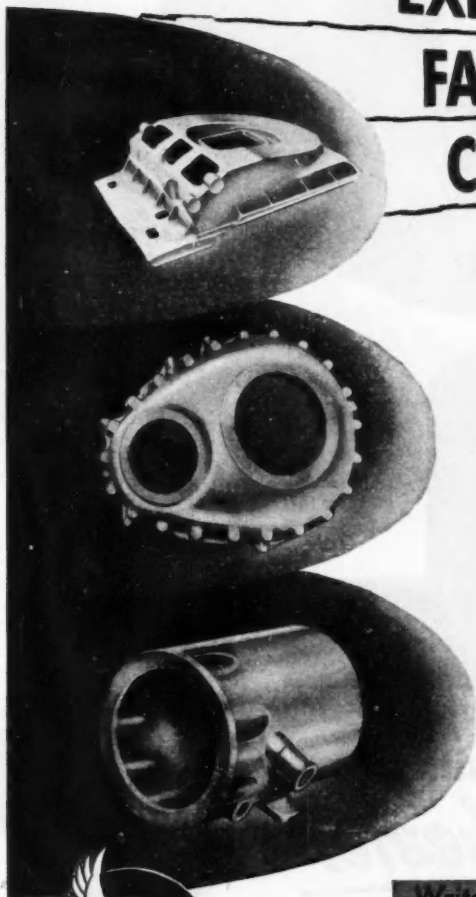
**Gas-Fired, Oil-Fired** **EF** **and Electric Furnaces**  
for any Process, Product or Production  
**THE ELECTRIC FURNACE CO.**

WILSON ST. at PENNA. R. R. *Salem - Ohio*

# FOR YOUR CIVILIAN AND DEFENSE JOBS . . .

*your Aluminum Castings supplier  
must have*

**EXPERIENCE  
FACILITIES  
CAPACITY**



These three essentials to reliable service protect you when you select Aluminum Industries, Inc., as your supplier of aluminum castings.

**EXPERIENCE** — Over 30 years of experience in working with aluminum and its alloys are behind the skill and "know how" of our metallurgists, engineers and foundry personnel.

**FACILITIES** — In each and every department, from the physical and metallurgical laboratories clear through to the finishing department, the most modern equipment is employed for precision processing, and to control quality at every step of production.

**CAPACITY** — You'll avoid delivery worries, too. With one of the largest aluminum foundries in the United States for the production of Permanent Mold, Semi-Permanent Mold and Sand Castings (monthly capacity over 2,500,000 lbs. of castings), you can depend upon Aluminum Industries to deliver your aluminum castings when you need them.



**PERMITE**

**Write for Bulletin 20-A . . .**

This new Bulletin illustrates and describes our complete facilities for serving your aluminum castings requirements. Recommendations and estimates given without obligations.



## **ALUMINUM INDUSTRIES, INC.**

CINCINNATI 25, OHIO

ALUMINUM PERMANENT MOLD and SAND CASTINGS . . . HARDENED, GROUND and FORGED STEEL PARTS

# 50,000 BTU's an hour

## 1 engine pre-heating

Floods engine components, battery, crankcase, carburetor with hi-velocity warm, dry air. Makes starting easier, faster, positive—even at 65° below!

## 2 personnel heating

Warm air—plenty of it—Independent of engine operation—circulates swiftly, evenly to keep personnel comfortable and more efficient!

## 3 windshield defrosting

Keeps windshield reliably "frost-free." Assures clear vision, safer driving at all times—completely independent of engine operation!



Model 1030

### overall— physical size

Weight (lbs.)	23
Height (inches)	8-3/4
Length (inches)	16-5/8
Width (inches)	6-7/32
Installation space (ft <sup>2</sup> )	.523



South Wind brings you all 3 with this...  
*compact new heater*

● Never before has so small a heater afforded such wide application—such amazing output of heat—as this new South Wind heater. Now, this truly compact unit, designed to meet military specifications, is available to assure maximum vehicle and personnel efficiency under the most stringent weather conditions.

**Versatile!** Offers equal performance for trucks, stationary engines, air-cooled and liquid-cooled engines. **Powerful!** The most powerful heater for its size in the world with a useable output of 50,000 BTU's per hour! **Adaptable!** Burns gasoline, jet fuel or kerosene. Simplified operation! Easy to install! **Reliable!** Even under the toughest operating conditions, heat, and plenty of it, is assured—immediately!

**Write Today** for specific model information or experienced counsel on any phase of heating. Address inquiry to South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

## South Wind

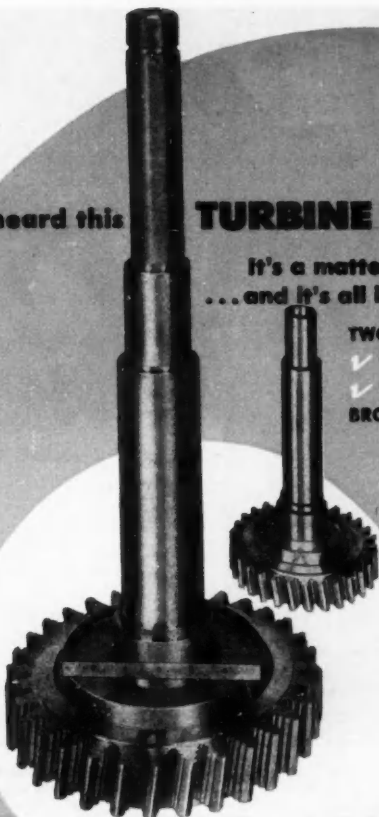


**PERSONNEL HEATING  
ENGINE AND  
EQUIPMENT PRE-HEATING  
WINDSHIELD DEFROSTING**

have you heard this

## Broaching TURBINE WHEEL STORY?

It's a matter of design and engineering  
...and it's all in the interchangeable fixture!



### TWO TURBINE WHEELS

- ✓ with different diameters
- ✓ with 8-branch and 4-branch "pine tree" slots

BROACHED WITH THE SAME BROACH

Here's an instance where LAPOINTE engineering resulted in the saving of time and money, tools and machines.

Because this jet engine manufacturer required two sizes of turbine supercharger shaft assemblies, we designed the slot so the same broach could serve for both diameter wheels. For the larger wheel, all four "pine tree" branches are used; for the smaller wheel only three are used.

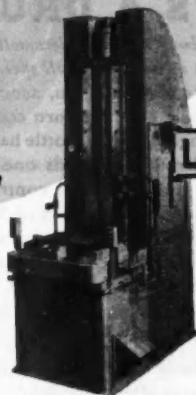
The interchangeable fixture makes it possible to broach both wheels on the same machine, with the same broach!

**50 YEARS IN BROACHING!**

We're the oldest in the world.

1902 • GOLDEN ANNIVERSARY • 1952

LAPOINTE ENGINEERING can help you in all your broaching problems. Fifty years of experience in building broaching machines, broaching tools, and fixtures can be placed at your disposal promptly ... on request.



**LAPOINTE**

Single Ram  
Vertical  
BROACHING  
MACHINE

Available in several  
sizes and capacities.

Fully described in  
our Bulletin SRV-10

Write for it.

THE

**LAPOINTE**

**MACHINE TOOL COMPANY**

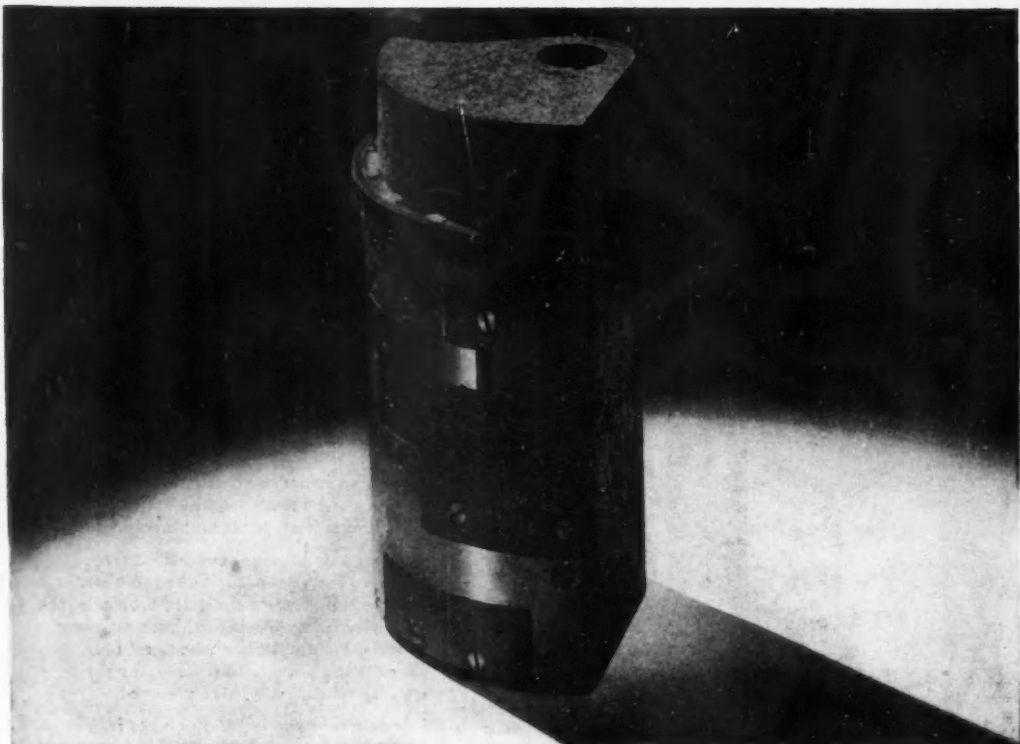
HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory: Watford, Herts., England



THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES





*A controller contact drum assembly, constructed of Celoron, Vulcanized Fibre and Brass.*

## HERE'S A DRUM THAT'S HARD TO BEAT!

*Ever wonder how a Diesel locomotive's speeds are controlled from stand-still to full speed? The throttle lever turns this contact drum, actuating governor solenoid controls which in turn control the speed of the Diesel engines. The throttle has ten positions: stop, idle, and running speeds one to eight. Each running notch on the throttle controller increases the engine speed in increments of 75 r.p.m., from 275 r.p.m. at idle to 800 r.p.m. at full throttle. A leading Diesel locomotive manufacturer designed this mechanism which uses two C-D-F materials to do a job requiring unusual insulating and mechanical strengths.*

The drum body is molded C-D-F Celoron, a macerated canvas-filled phenolic material. The special shape, a sector of a cylinder, is uniformly molded and is half the weight of aluminum . . . dimensionally stable . . . of superior electrical and mechanical strength. Eight and a half inches high, the drum has been drilled and broached; brass

screws attach a cast brass contact surface, milled to give the desired contact arrangement.

Tough, flexible C-D-F Vulcanized Fibre is between the contacts, enabling the contact fingers to slide from the metal to the insulated surface without dipping into the space between the contacts. Fibre was specified because of its unusual arc extinguishing and non-tracking characteristics. Whenever a circuit is broken, the resulting arc is drawn out across the surface of one of the Vulcanized Fibre segments, thereby protecting the surface of the phenolic drum from the arc.

If you have an insulating problem, probably a C-D-F product is the answer. C-D-F manufactures and fabricates electrical insulation, laminated and molded plastics, Micabond and Teflon tapes and sheets. Sales offices are located in principal cities. Call your C-D-F sales engineer—he's a good man to know!

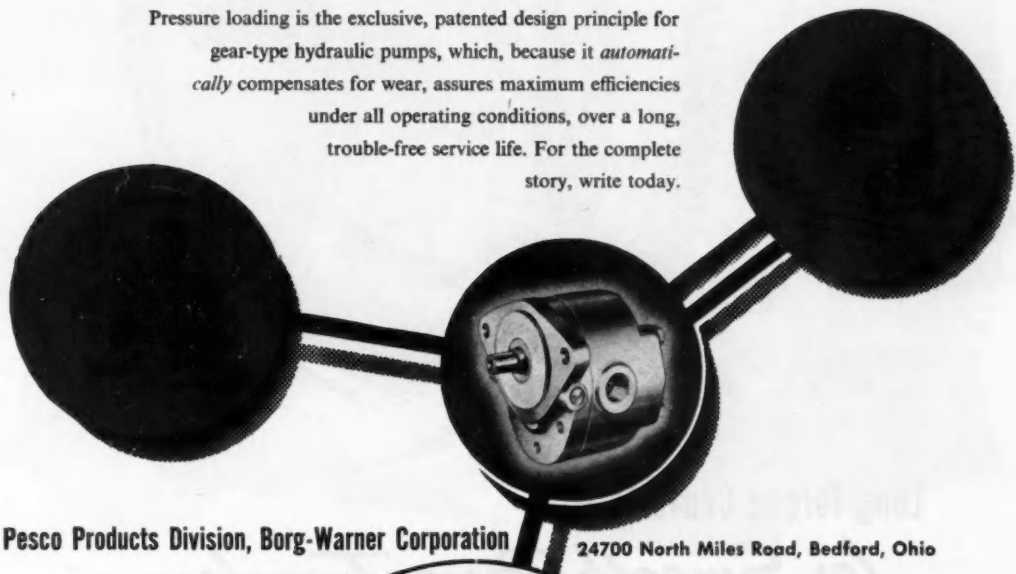


*Continental-Diamond Fibre Company*

GENERAL OFFICES  
NEWARK 2, DELAWARE

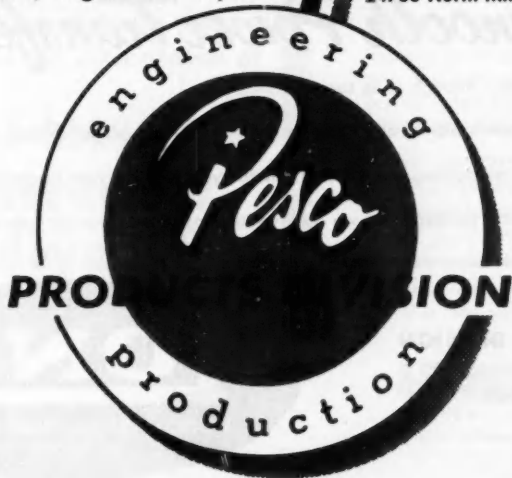
# Only Pesco hydraulic pumps offer "pressure loading"

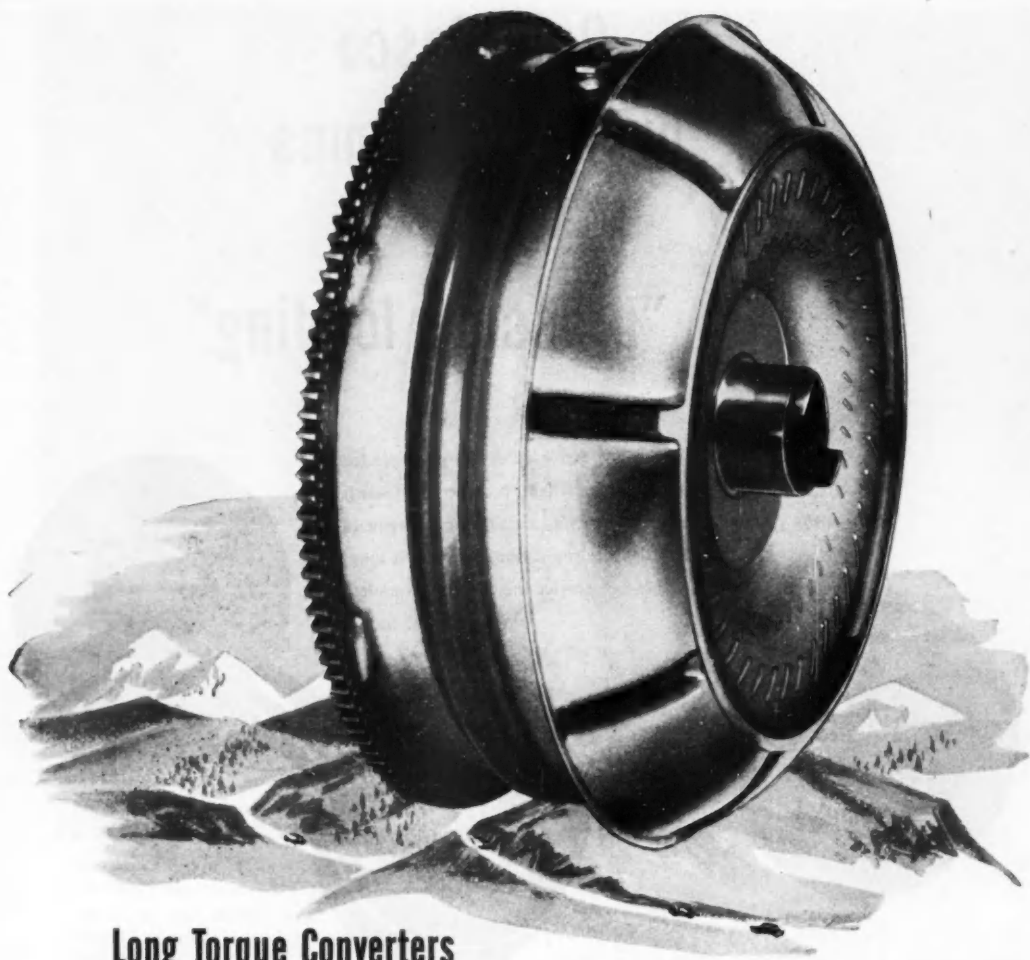
Pressure loading is the exclusive, patented design principle for gear-type hydraulic pumps, which, because it *automatically* compensates for wear, assures maximum efficiencies under all operating conditions, over a long, trouble-free service life. For the complete story, write today.



Pesco Products Division, Borg-Warner Corporation

24700 North Miles Road, Bedford, Ohio





## Long Torque Converters *for Smooth Power Transfer*

Power moves smoothly through Long torque converters.

They give velvet-smooth pickup and infinitely variable torque multiplication.

Designed for direct air-cooling, our converter helps you simplify your transmission system.

You get an economical package . . . we achieve low-cost production by fabricating the assembly units almost entirely from stampings.

### LONG MANUFACTURING DIVISION

Borg-Warner Corporation

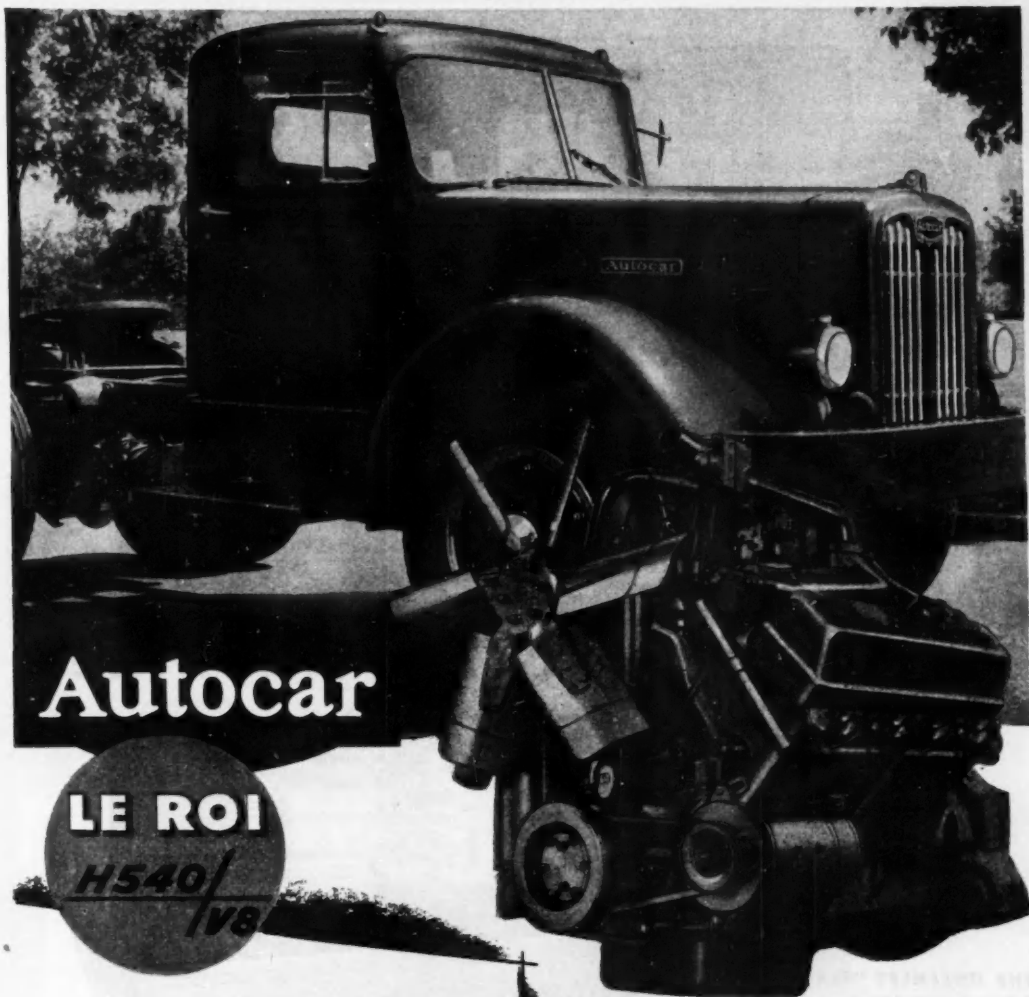
DETROIT 12, and WINDSOR, ONT.



# LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS  
OIL COOLERS





# Autocar

**LE ROI**

**H540/  
V8**

Two great names join forces  
to bring you the advantages of

**the first heavy-duty  
highway-tractor  
powered by a 200-hp  
V-8 engine!**

**N**OW — the first V-8 engine for heavy-duty highway hauling. It has 200-plus horsepower — gives you low weight-to-horsepower ratio (6 lbs. per HP). And you get it only in this new, reduced-weight, heavy-duty Autocar V-8!

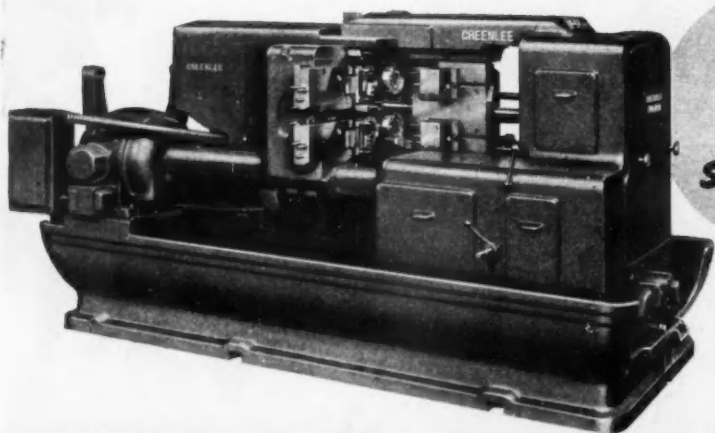
Here Autocar's 55 years of heavy-duty truck-building experience combine with Le Roi's 25 years' experience building V-type engines, to give you bigger payloads, faster acceleration, smoother operation, greater flexibility.

Get the whole money-making story on the Autocar V-8. See your nearest Autocar branch office, or write the Autocar Company, Ardmore, Pa.

**LE ROI COMPANY**

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio



**4**  
SPINDLE

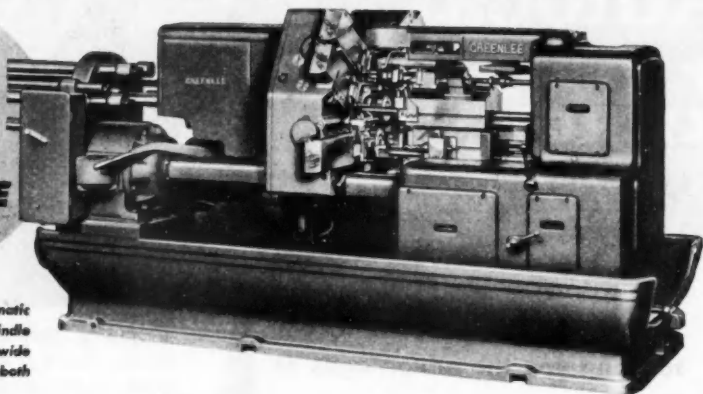
**THE GREENLEE "FOUR"**

A heavy-duty automatic made in 1½" and 2½" spindle capacities. The "Four" incorporates all the cost-cutting features of the well-known "Six" (see below).

# GREENLEE

## AUTOMATIC SCREW MACHINES

**6**  
SPINDLE



**THE GREENLEE "SIX"**

A ruggedly-built, high-speed automatic ... available in 1", 1½", and 2" spindle capacities ... capable of handling a wide range of work ... widely used on both short and long-run jobs.

### OUTSTANDING FEATURES OF ALL GREENLEE AUTOMATICS

*Write for literature describing in detail all the features of Greenlee Automatics.*



**UNIVERSAL TOOLING** — Tool holders fit any cross-slide cavity ... are easily and quickly changed ... reduce equipment costs.

**INTERCHANGEABLE CAMS** — Can be changed at will without re-adjustment of tools and holders. Cam storage is held to a minimum ... cam costs greatly reduced.

**BUILT-IN THREADING DRIVE AND FEED** — Not an extra attachment, but standard equipment on Greenlee Automatics.

**BUILT-IN COOLANT SYSTEM** — Eliminates cumbersome piping in tooling area ...

gets coolant right where it does the most good.

**LARGE TOOLING AREA** — Permits using many timesaving, cost-cutting auxiliaries that often eliminate second operations.

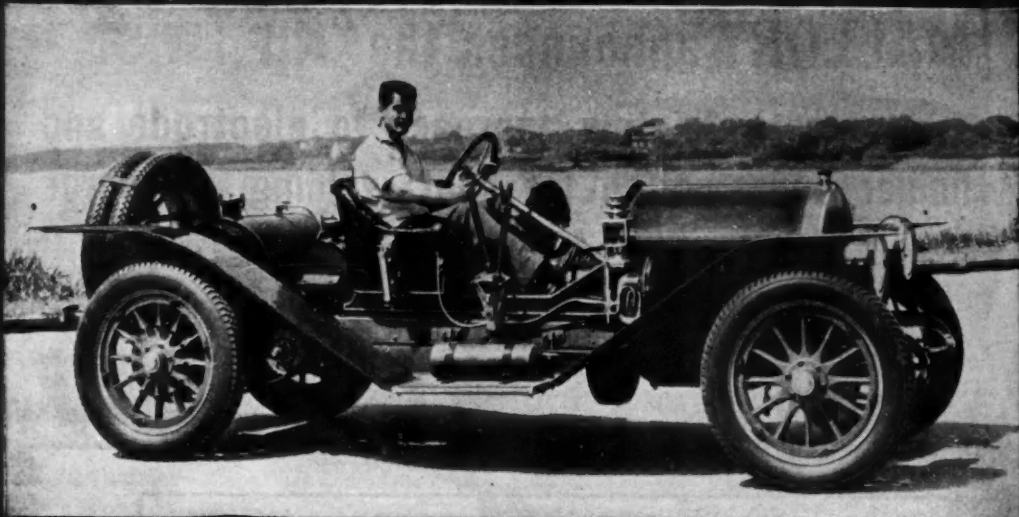
Various special adaptations of standard Greenlee Automatics can be made ... for handling second-operation work ... for tooling extra-long work pieces ... for multiple feed-out arrangements, etc.

Send us details of your work. Let our engineers show you how profitably Greenlee Automatics can be applied to your production.

**GREENLEE BROS. & CO., 1759 Mason Ave., Rockford, Ill.**

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES





Send for free print

Four-cylinder, 53-hp. Simplex automobile, 1910. This luxurious car sold for \$5,400, featured 129" wheelbase, double-chain final drive, Krupp steel channel frame, four-passenger capacity, a weight of 4500 pounds.

*This is one of a series of old automobile prints that will appear in future Morse advertisements. Write for free, enlarged copy, suitable for framing for your collection.*

# M = TC

**Morse *means*  
Timing  
Chains**

**MORSE**

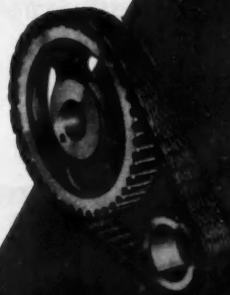
MECHANICAL  
POWER TRANSMISSION  
PRODUCTS



From the time of the Simplex chain-drive automobile shown above, Morse has produced over 54 million timing-chain drives for the automotive industry.

It only stands to reason that when you need expert engineering and design help, when you want precision-built, economical timing-chain drives, it will pay you to come to the automotive industry's headquarters for timing-chain drives.

Talk with Morse engineers. In short order you'll see why M = TC; Morse means Timing Chains.



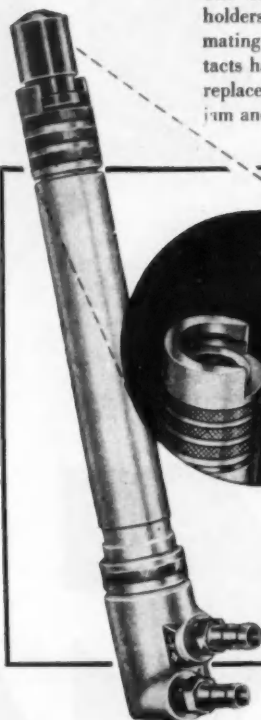
# MALLORY announces the "Nu-Twist"\*

... an entirely new approach to electrode and holder construction for spot welding pressures over 6000 pounds

The new Mallory Heavy Duty "Nu-Twist" holders and electrodes are designed with flat mating surfaces. Threaded and tapered contacts have been eliminated. Electrodes can be replaced quickly and easily... they won't jam and slow down production.

If you are using spot welding pressures over 6000 pounds in your plant on aircraft structures, ordnance equipment, jet engines and similar components... "Nu-Twist" holders and electrodes will save "down time"... speed production. Study the cut-away and you'll see why.

\*Trademark; Patent Applied for



① Manually operated locking nut requires no tools and permits fast, easy replacement of electrodes.

② Flat, silver-plated mating surfaces between electrode and holder give good electrical contact and effectively support the highest welding pressures.

③ "O" Ring seal provides water tight seal at all times.

④ Double groove construction in locking nut positively aligns electrode in holder.

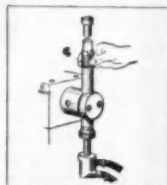
⑤ Coolant hole and wall thickness properly proportioned to insure efficient cooling with adequate metal section to carry higher welding currents without overheating.

*Write for your copy of Bulletin 8-17. It is just off the press and contains complete data on "Nu-Twist" holders and electrodes.*

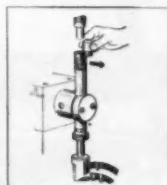
**"Nu-Twist" electrodes are fast and easy to change...**



① Shut off water and pull down coolant head.



② Loosen locking nut.



③ Slide out old electrode... slide in new one.



④ Reassemble and you're ready to weld.

P. R. MALLORY & CO. INC.  
**MALLORY**

#### SERVING INDUSTRY WITH THESE PRODUCTS:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators  
Electrochemical—Capacitors • Rectifiers • Mercury Dry Batteries  
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

**JUST TAKE OFF THE COVER...  
AND IT'S WIDE OPEN FOR  
INSPECTION  
OR SERVICE**

**EVANS**

**ACCESSIBILITY OF DESIGN  
SAVES TIME,  
TEMPER AND MONEY**

**UNBREAKABLE, LIGHTWEIGHT FAN**

with precision die molded airfoil section blades  
moves maximum air with least noise and power  
consumption. Sturdy one-piece construction; nothing  
to loosen or get out of balance.

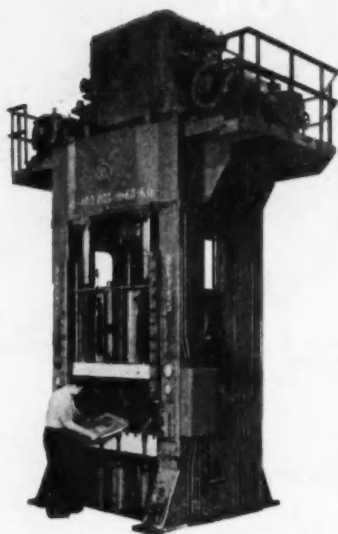


**EVANS**

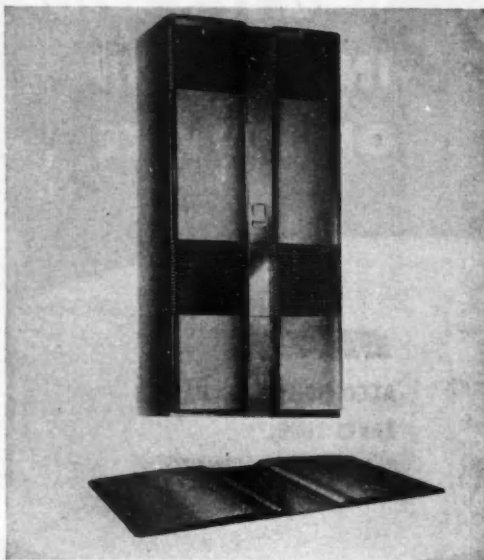
**ENGINEERS CUSTOM HEATING AND VENTILATING  
FOR A WORKING WORLD ON WHEELS**



# The trend is to more stampings WITH **BLISS** PRESSES... ✓



1200 14-gauge drip pans are drawn and formed daily in this Bliss press which has a 400-ton blankholder pressure and 200-ton plunger capacity.



Hard-to-make contours in this center-section stamping for a Weathermaker are drawn from 20-gauge steel at the rate of 1800 daily.

## Versatile Bliss Hydro-Dynamic Allows Unusual Metal Design

A new 600-ton Bliss double-action Hydro-Dynamic press helps Carrier Corporation produce nice-to-look-at but tough-to-make contours for its line of air conditioners.

Carrier's Vice President of Manufacturing reported that, "By varying ram, blankholder and cushion pressures and the draw cycle, we have been able to complete difficult drawing operations with sharp corners and small radii at the bottom... Actually, the press has exceeded our expectations."

Top performance? Of course—but it's all a matter of picking the proper press. It's what Bliss engineers mean by "the right press for the job."

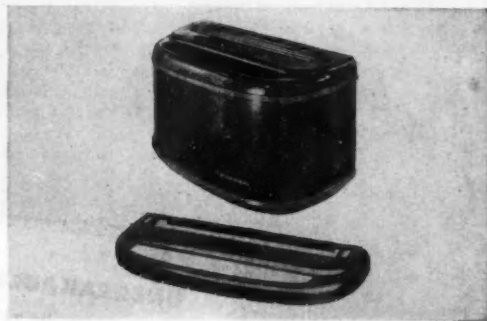
**E. W. BLISS COMPANY, CANTON, OHIO**

E. W. Bliss (England) Ltd., Derby, England

E. W. Bliss Company (Paris), St. Ouen sur Seine, France

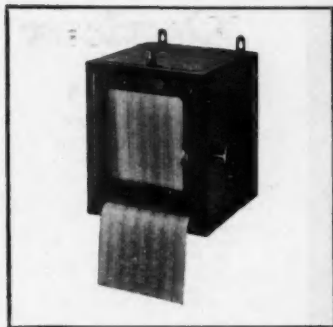
**PRESSES, ROLLING MILLS, SPECIAL MACHINERY**

Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo, and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Co., Seattle. Other dealers in United States cities and throughout the world.



Top panel for window-model Room Air Conditioner has intricate contours, sharp corners and bottom radii. Yet Carrier was able to produce them at the rate of 1200 per eight-hour shift.

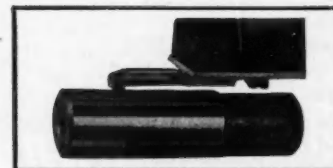
**BLISS** ON YOUR  
PRESS IS MORE THAN A NAME  
...IT'S A GUARANTEE!



**RECORDS SIX VARIABLES SIMULTANEOUSLY.** The Brush six-channel Magnetic Oscillograph is designed for simultaneous recording of six electrical and/or mechanical phenomena, with a chart record instantaneously available. This instrument facilitates multiple strain measurement, vibration analysis, wind tunnel work, circuit analysis, etc. Built-in gear changer provides instantaneous shift from high to low speed; wide choice of chart speeds available.



**RECORDS SIX VARIABLES CONSECUTIVELY.** If simultaneous strain measurements are not necessary, consecutive measurements can be made with substantial saving in equipment cost. The Universal Bridge Switch, when coupled with a Brush Universal Analyzer and two-channel Magnetic Oscillograph, permits consecutive recording of strain measurements from six different locations on the structure or specimen being tested. One of the two channels of the oscillograph records strain, the other channel indicates the location of the particular strain measurement.



**CHARTS SURFACE PROFILE.** As this Brush Pickup probes the surface on the cylindrical piece, a chart is drawn by a Brush Surface Analyzer . . . giving positive, numerical recording of the surface profile. Surface irregularities of less than 1 micro-inch can be measured accurately. Brush Surface Analyzers eliminate guesswork in specifying and checking finishes on various surfaces: metal, plastic, glass, paper, etc. In addition to chart recording, *average finish* is indicated on a large illuminated scale.

For catalog describing these Brush instruments, write The Brush Development Company, Dept. EE-34, 3405 Perkins Avenue, Cleveland 14, Ohio.



## QUICK LOAD MEASUREMENTS PREVENT PRESS BREAKDOWNS

● Easy testing of operating parts and structures with Brush Strain Analyzers simplifies preventive maintenance.

Here, in the plant of a large manufacturer of automotive parts, periodic checks are made on this 150-ton mechanical press to spot possible overloading. With resistance-type strain gages mounted on the press, the signal is amplified and recorded by the Brush Strain Analyzer . . . producing an *immediate chart record* of press strain.

Since measurements can be made quickly and easily, the Brush Strain Analyzer furnishes a *practical method* of preventing overloading and costly breakdowns, and lengthening press life.

You can use Brush Recording Analyzers to save time and solve problems . . . in measurement of strain, torque, vibration, pressure, d-c or a-c voltages or currents, and other variables. Brush representatives are located throughout the United States. In Canada: A. C. Wickman, Limited, Toronto.

For catalog write The Brush Development Company,  
Dept. DD-34, 3405 Perkins Avenue, Cleveland 14, Ohio.

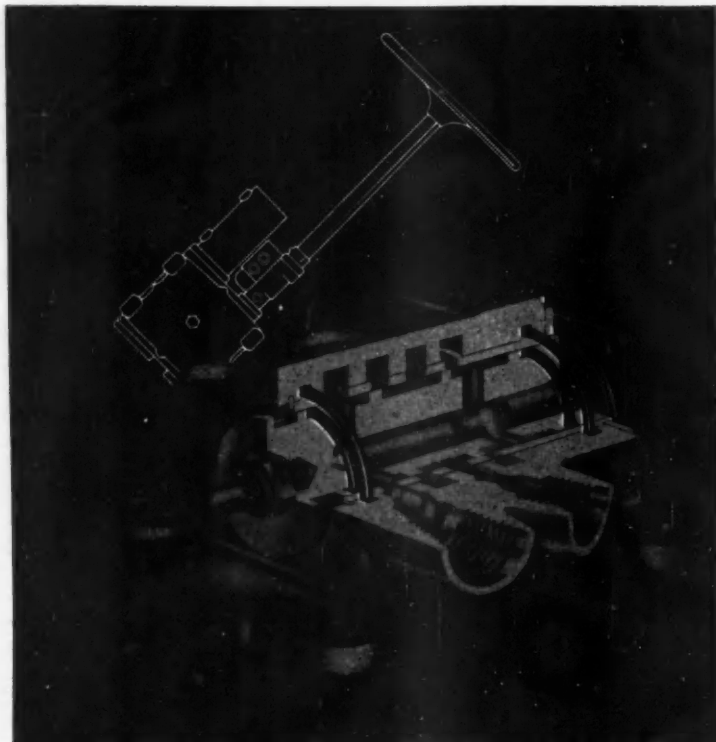
PUT IT IN WRITING WITH A BRUSH RECORDING ANALYZER...

THE **Brush**  
DEVELOPMENT COMPANY



Piezoelectric Crystals and Ceramics  
Magnetic Recording Equipment  
Acoustic Devices  
Ultrasonics  
Industrial & Research Instruments





Cutaway view showing PARKER O-rings in control valve of Ross Hydropower Steering Gear.

## PARKER O-RINGS... for Simplified Sealing

THIS IS IT



Cross section drawing of O-ring in groove, sealing under pressure.

It's easy to design your product to incorporate PARKER synthetic rubber, *leakproof* O-ring seals. That's why they're economical to use. A simple, small groove is all that's required. There is no structure to support; no added weight. They can be used in either moving or non-moving applications... are easy and economical to replace.

PARKER is the one source for *all* standard O-rings to meet specifications covering fuel, hydraulic and engine oil services... and for special service O-rings of tested and approved compounds. Ask your PARKER O-ring Distributor (see right) for Catalog 5100, or write The PARKER Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio.

# Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

# Parker

## O-RINGS

ARE STOCKED BY  
THESE AUTHORIZED  
DISTRIBUTORS

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Air Associates, Inc.  
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Shields Rubber Co.  
108 N. Clinton St., Chicago 6, Ill.

CLEVELAND, O.  
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Naff-Parkins Co.  
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Air Associates, Inc.  
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Shields Rubber Co.  
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PORTLAND, Ore.  
Hydraulic Power Equipment Co.  
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ST. LOUIS, Mo.  
Metal Goods Corp.  
5239 Brown Ave., St. Louis 15, Mo.

WICHITA, Kan.  
Standard Products, Inc.  
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CANADA  
Railway & Power Engineering Corp., Ltd.



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BELGIUM • BRITISH ISLES • CENTRAL and SOUTH AMERICA  
• FRANCE • HOLLAND • INDIA • ITALY • JAPAN  
• PAKISTAN • SWEDEN • SWITZERLAND

THE

# Ajax

MANUFACTURING  
COMPANY

EUCLID BRANCH P. O. CLEVELAND 17, OHIO

110 S. DEARBORN ST.  
CHICAGO 3, ILLINOIS

DEWART BUILDING  
NEW LONDON, CONN.

• • •

**YOU GET THE  
RETURNS ON THIS BIG  
INVESTMENT**

Shown here is the new massive 40,000 pound drop hammer, only a small part of the \$5,000,000 expansion program that is paying big dividends to forging users in the form of more and better forged parts.


The demand for forgings is at an all time high . . . particularly the demand for top quality Kropp forgings. With our greatly expanded facilities we are better able to supply the needs of American industry. For your forged parts, drop, flat die or upset, contact Kropp . . . "America's Number One Forge Company" . . . where better forgings are made.

# KROPP FORGE COMPANY

CHICAGO 50, ILLINOIS

**SUBSIDIARIES**

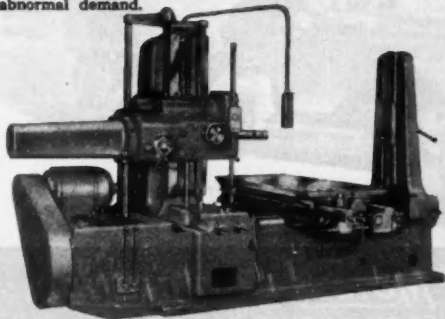
KROPP STEEL CO., Rockford, Ill. . . . for structural and welded steel products.  
KROPP FORGE ORDINANCE CO., Melvindale, Mich. . . . for your defense program.



*This is one of America's outstanding plants of its kind, and every tool in it is there for the production of Lucas Horizontal Boring, Drilling and Milling machines. This specialisation means a greater output of critically needed machines for the defense program.*



**We still have to keep many a loyal customer waiting, because our output like that of all other defense machine suppliers has been governed by regulations plus an abnormal demand.**



*Your inquiry and your order are still as welcome as ever. When you do get the Lucas you need you'll find it your No. 1 money maker — the most used machine in the shop.*



**LUCAS**  
*Precision*

**HORIZONTAL BORING, DRILLING AND MILLING MACHINES  
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.  
CLEVELAND 8, OHIO**



BALANCED IN ALL THE FACTORS THAT MAKE FOR OUTSTANDING PERFORMANCE, RED SEAL ENGINES ARE STANDARD IN LEADING MAKES OF EQUIPMENT, NOT ONLY FOR TRANSPORTATION, BUT FOR A WIDE RANGE OF APPLICATIONS IN INDUSTRY, AS WELL AS ON FARM AND RANCH.

VITAL AS IT IS, horsepower rating is only one of several points about the engine which you should check carefully when investing in a truck or tractor. Fully as important in their bearing on the unit's long-range earning power are such factors as fuel economy and long life. And with one of today's Continental Red Seal engines under the hood, you get a balanced combination of all three. . . . In design, in materials, and in performance over the road, Red Seal engines give you the benefit of 50 years' aggressive engineering. Exclusive Continental features wring the power from the fuel. And traditional Red Seal ruggedness, carried to a new high, finds its natural reflection in rock-bottom upkeep costs. . . . You clinch all three main factors in profitable operation when you choose a truck with Continental Red Seal power.

2-600  
Transportation  
Engine

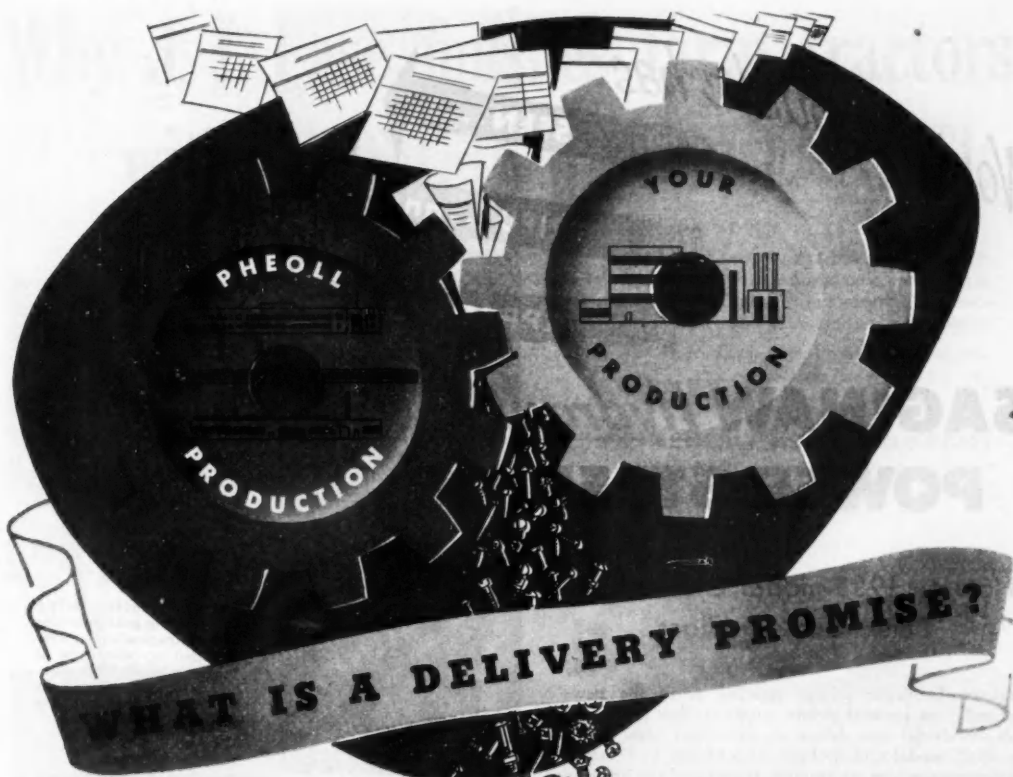


REMEMBER, ANY EQUIPMENT IS BETTER WITH CONTINENTAL RED SEAL POWER



**Continental Motors Corporation**  
MUSKEGON, MICHIGAN





**At PHEOLL it is a  
determination to earn  
and hold your TRUST**

Your order for screw products...your delivery requirements...*set the pace at Pheoll Manufacturing Company.*

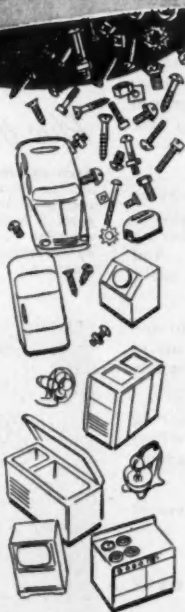
We recognize that your fastener orders have been planned to meet definite production schedules. We know that "down time" is costly. That's why Pheoll exerts every effort to deliver *the products you have ordered, as you have ordered them, and at the time specified.*

But going much further, a Pheoll delivery promise is a carefully-considered pledge, based on definite factors. Once you have been given a promise, your order

is assigned a fixed spot in our own efficient schedule. *No other order, regardless of size, can displace it.* And both production-wise and method-wise, Pheoll is set up to complete your order **AS PROMISED.**

We produce billions of pieces annually...over 10,000 separate items...scheduled against a thousand first and second operation machines. That's really a complex problem! But Pheoll has developed systems for production scheduling and order control which we firmly believe to surpass those of any other screw producer...and Pheoll is one of the largest.

If, in your own operation, maintained schedules and assured delivery of components are imperative, may we send you our booklet entitled, "*Pioneering in Customer Service?*" It shows why you can rely on Pheoll as a dependable source of supply for all types of threaded fasteners.



**PHEOLL**



**SCREWS  
BOLTS**

*Now the public has*

SEEN...

TRIED... and

APPROVED



## SAGINAW *Hydraulic* POWER STEERING

Now on 1952 model Oldsmobiles,  
Buicks and Cadillacs

Saginaw hydraulic power steering is in the news! Recently, the general public caught its first glimpse of this wonderful new device on passenger cars. Shown on 1952 model Oldsmobiles, Buicks and Cadillacs in showrooms across the country, it captured the imagination of the public. Thousands tried it—and approved of what they found. For "there is no steering like power steering... and no power steering like Saginaw hydraulic power steering."

Already Saginaw power steering has proved its value... proved it on thousands of commercial vehicles since it was introduced in 1939 to make the steering of heavy-duty trucks and buses easier and safer. And during World War II many of America's giant tanks were Saginaw equipped.

Saginaw power steering can be easily adapted to any make or model automobile, and Saginaw engineers are available to work with car manufacturers at any time on new applications.

Remarkably simple in design, Saginaw power steering has fewer moving parts, fewer parts in all. "Wheel pull" is easily adjusted to the individual requirements of any car.

Write Saginaw Steering Gear Division of General Motors for full details.

IF IT'S EASY TO STEER... IT'S A SAGINAW GEAR

**Saginaw**  
STEERING GEAR DIVISION

General Motors Corporation, Saginaw, Michigan

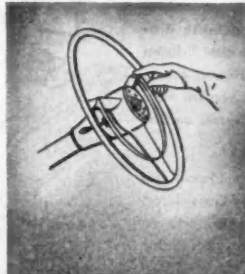
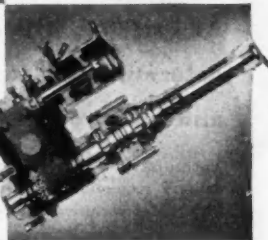


*This...*

Saginaw's recirculating ball steering gear provides almost frictionless operation that no other type of gear can equal. This principle has been proved on over a million automotive steering gears.

*Plus this...*

Saginaw's hydraulic power steering gear gives a tremendous lift to driving ease. A hydraulic booster does the work... replaces driver effort with power steering.



*Equals this...*

Parking is a simple matter in a car equipped with Saginaw power steering. The smallest woman can spin the wheel of the biggest car with finger-tip ease.

\* Optional equipment at extra cost.

**SSG**  
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ENGINE AND AIRCRAFT PARTS

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J. I. Case is another one of the world's largest farm equipment manufacturers using Rinsched-Mason enamels . . . because industrial colors carrying the Rinsched-Mason name are scientifically manufactured for exceptional workability and excellent drying qualities.

*We shall be glad to help you with your own color problems, just drop us a line.*

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formula of aluminum with zinc, magnesium, titanium and chromium . . . as ideal for precision optical parts as for gun turrets. Frontier 40-E may be just the alloys to give YOU better results. Why not investigate?

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*Remember — if ALUMINUM can do it better — FRONTIER 40-E  
ALUMINUM ALLOY can do it best!*

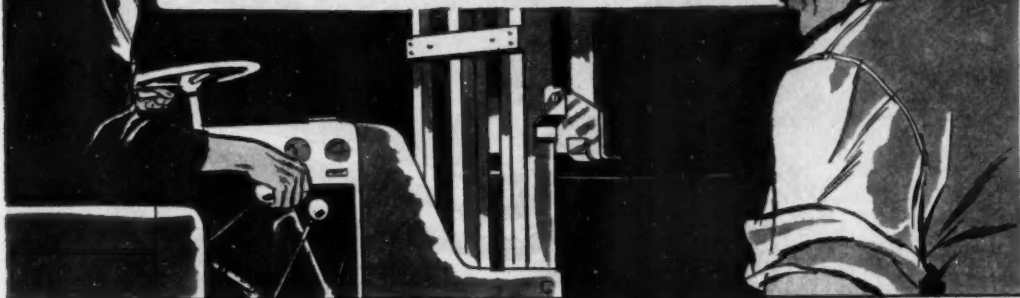


### FRONTIER BRONZE CORPORATION

4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

## Schrader Contributions to the Tire Industry

*Where do you  
want me to put  
these valve machines?*

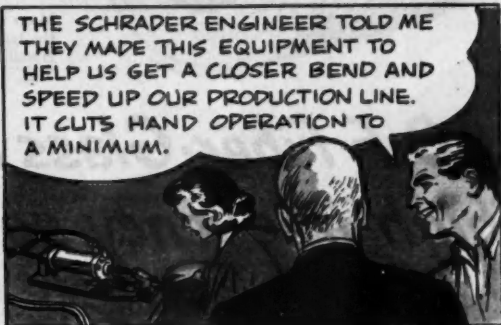


HERE'S THE AIR-OPERATED VALVE BENDING MACHINE FROM SCHRADER FOR OUR TUBE PRODUCTION LINE.

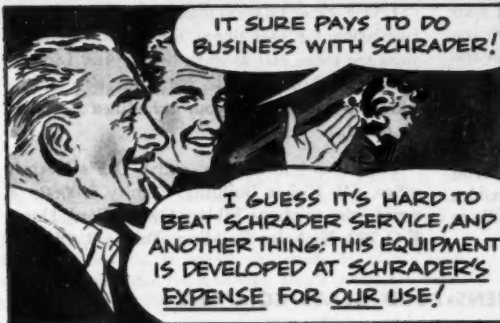


THAT'S GOOD.

THE SCHRADER ENGINEER TOLD ME THEY MADE THIS EQUIPMENT TO HELP US GET A CLOSER BEND AND SPEED UP OUR PRODUCTION LINE. IT CUTS HAND OPERATION TO A MINIMUM.



IT SURE PAYS TO DO BUSINESS WITH SCHRADER!



I GUESS IT'S HARD TO BEAT SCHRADER SERVICE, AND ANOTHER THING: THIS EQUIPMENT IS DEVELOPED AT SCHRADER'S EXPENSE FOR OUR USE!

### NOTE TO THE TIRE INDUSTRY:

Schrader service extends right to the tube production line. We make available special equipment to help you speed production of pneumatic tubes. Are you taking full advantage of this phase of Schrader service?

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Division of Scovill Manufacturing Company, Incorporated

# Schrader

REG. U. S. PAT. OFF.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT





Many fine new cars rolling off the assembly line are equipped with the latest advance to promote passenger comfort . . . the L-O-F Hoodliner that muffles engine sounds.

## *L-O-F Fiber-Glass Hoodliner reduces high-frequency sounds to a whisper*

**L-O-F Fiber-Glass also insulates roofs, trunks, and fire walls**

TODAY, passengers enjoy the comfort of near silence in new cars and trucks through the use of the L-O-F Hoodliner. Installed under the hood, the Fiber-Glass Hoodliner mutes high-frequency engine sounds, tire whine and air-stream whistle.

Highly efficient, Fiber-Glass insulation absorbs sound and substantially reduces air-borne noise in cars and trucks. Lightweight, flexible, oil- and grease-resistant, the L-O-F Hoodliner is easily installed on the assembly line.

L-O-F Fiber-Glass is also supplied as superior insulation for roof liners, on fire walls, under package trays and as dash liners. And Libbey-Owens-Ford lives up to its reputation in the industry of meeting your schedules . . . *right on time!*

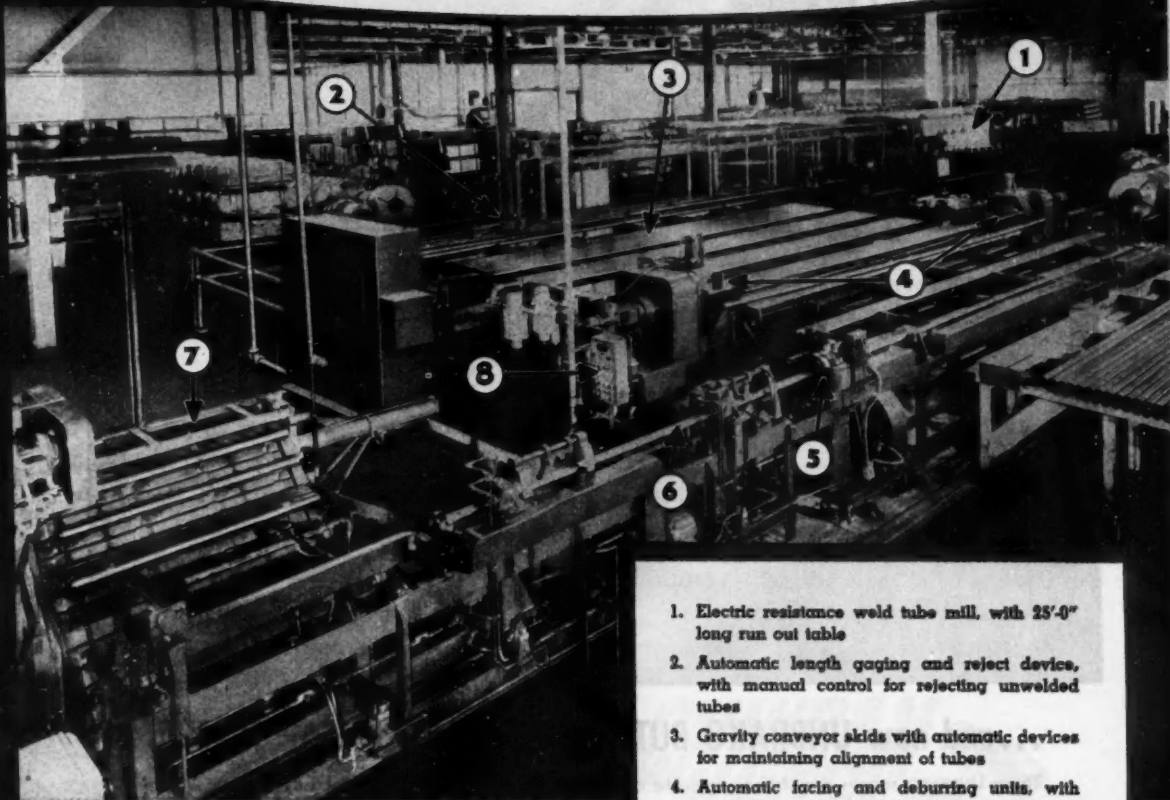
For more information, call L-O-F's Detroit office, 610 Fisher Building, Trinity 5-0080; or write, wire or phone Libbey-Owens-Ford, Dept. F-G 792, Nicholas Building, Toledo 3, Ohio.



**LIBBEY-OWENS-FORD GLASS COMPANY**  
FIBER-GLASS DIVISION

# FIBER-GLASS

# Special **DUNCAN-McKAY** *Completely Automatic Cut-up Line* **FOR TUBE FINISHING OPERATIONS**



Finishing and cutoff operations have always proved to be a bottleneck in tube production. The McKay Automatic Cutup Line at Ford's Mound Road, Detroit Plant, provides complete automatic control of length gaging — facing — chamfering and cut to length operations for Ford's rear axle and torque tube requirements. Ford's policy of "Automation wherever Practical" really pays off here with increased production — closer tolerance control — less scrap loss and reduced cost per piece.

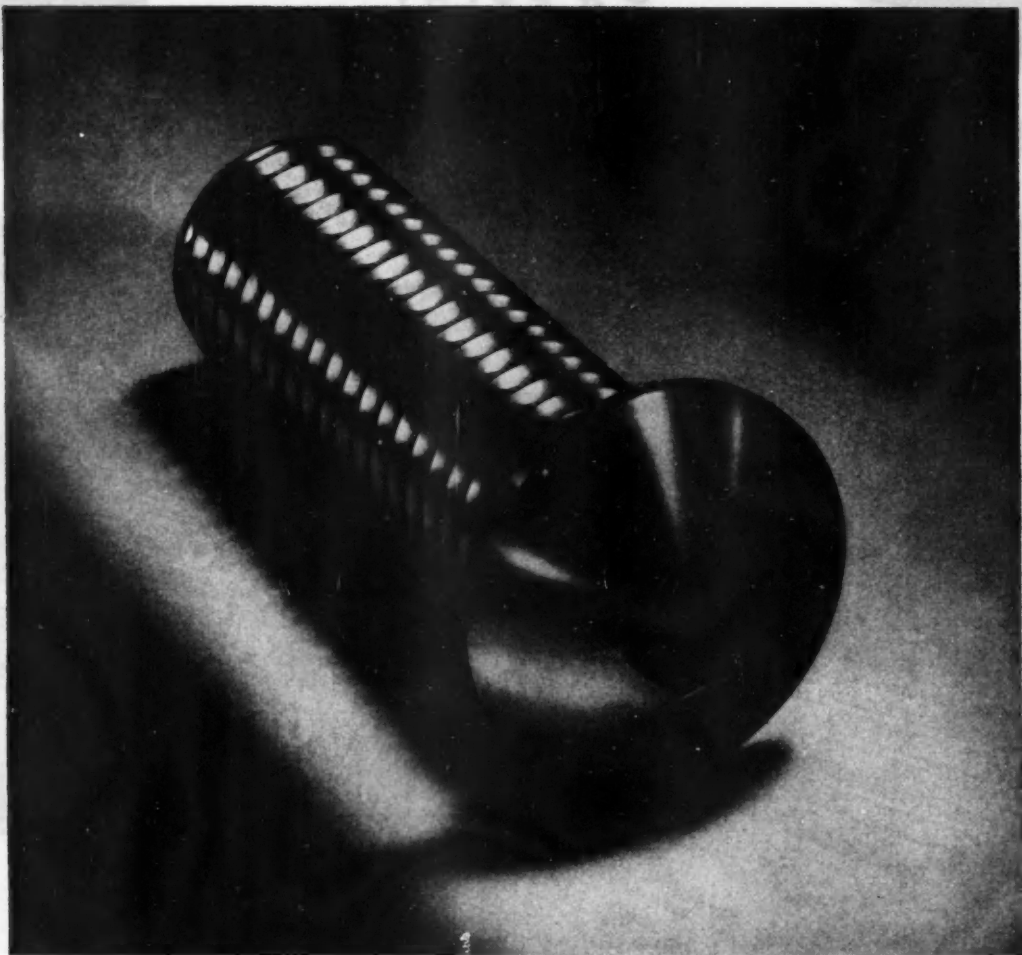
If you have a similar problem, contact McKay engineers.

1. Electric resistance weld tube mill, with 25'-0" long run out table
2. Automatic length gaging and reject device, with manual control for rejecting unwelded tubes
3. Gravity conveyor skids with automatic devices for maintaining alignment of tubes
4. Automatic facing and deburring units, with sequence control for loading — indexing — clamping — cutting and unloading tubes
5. Duncan-McKay automatic tube cutoff with magnetic conveyor rolls — positive hydraulic feed and hydraulic torque converter drive for the cutting head
6. Mandrel end — with automatic length gage — magnetic exit conveyor and automatic dumping device
7. Automatic exit conveyor for cut length tubes
8. Operating control station with push button control of all automatic functions.

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EQUIPMENT FOR THE AUTOMOTIVE,  
FABRICATING AND STEEL INDUSTRIES

The **McKAY MACHINE Company**  
YOUNGSTOWN, OHIO





## ...and now UNBRAKO BUTTON HEAD SOCKET CAP SCREWS

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- Head and threads concentric with the body
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- Stocks at your UNBRAKO industrial distributor
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**SPS**  
JENKINTOWN PENNSYLVANIA

# BOEING'S 7 LEAGUE BOOTS MAKE "HAPPY LANDINGS"



**CHIKSAN**

More and more airframe manufacturers are turning to CHIKSAN Aero-Hydraulic Swivel Joints and assemblies — to insure maximum safety, dependability and economy in their flexible lines.

Boeing's B-47 STRATOJET Bomber, the fastest known bomber in the world, relies on CHIKSAN Aero-Hydraulic Swivels to bring this 185,000 pound sky-giant to feather smooth stops.

Boeing's complete confidence in CHIKSAN Aero-Hydraulic Swivel joints' performance is confirmed by their selection of Chiksan joints for Boeing's B-47; B-50 and B-52 — three giants of the air lanes.

The requirements of each airframe manufacturer become the subject of specialized study by CHIKSAN's Engineering, Research and Development Division.

Hydraulic Joints and Assemblies are designed to meet each individual requirement. Designs are available for all aircraft applications handling hydraulics, fuels, oils, water, air, oxygen and other fluids.

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CHIKSAN Aero-Hydraulic swivel joints and assemblies for 1000 to 3000 psi systems surpass all standards set down for both civilian and military use.

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## HUDSON MOTOR COMPANY HAS SELECTED PRE COMPRESSORS SINCE 1925

**Air Capacity of Gratiot Plant is now 13,200 cfm at 100 psi**

When a fifth Ingersoll-Rand PRE Compressor went into operation recently, the Gratiot Plant of the Hudson Motor Company boosted its compressed air capacity from 10,000 cfm to 13,200 cfm. Thousands of air-operated tools, welders, paint sprayers and presses on the Hudson assembly lines set the pace which required this additional air capacity. The newest PRE operates along with four older PRE synchronous-motor-driven compressors. The first one was installed 27 years ago and is still going strong.

This is only one example of the dependability and reliability for which Ingersoll-Rand PRE Compressors are known. They are heavy-duty machines built for full-load service wherever large volumes of air or gas are to be handled. The two-cylinder design is standard on sizes up to 1000 horsepower. The 4-cylinder or so-called "4-corner" design is used on the larger sizes up to 3000 horsepower.

For the full story on the PRE, consult your nearest I-R representative.

# Ingersoll-Rand

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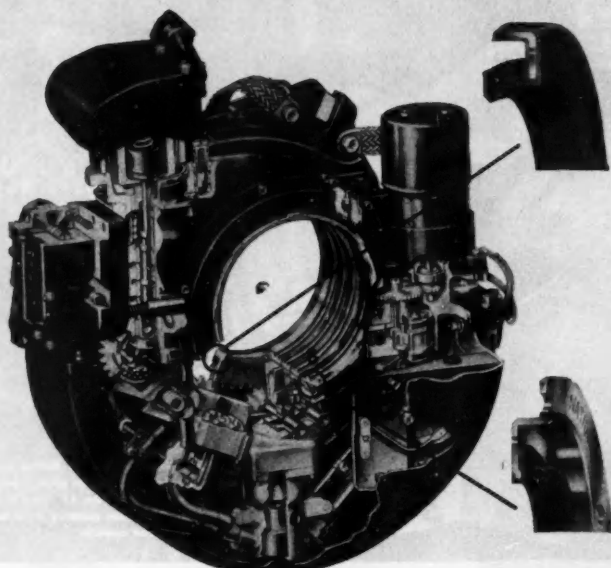


Figure 1. Propeller Integral Oil Control Assembly

## "No-leakage" sealing at high surface speeds throughout a broad range of temperatures

In the design of aircraft assemblies, engineers are often faced with a combination of problems not encountered in surface equipment. Important among these from an oil-sealing standpoint are temperature extremes, high surface speeds and the necessity of preventing any oil or fluid loss.

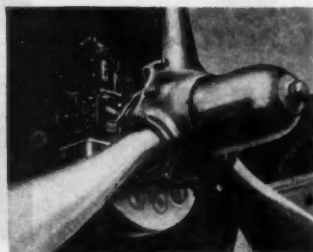
Each of these phenomena is an important factor in sealing the Integral Oil Control Assembly of Hamilton Standard propellers for large aircraft. In this assembly, the specific requirement is to provide a positive seal at front and rear transfer bearing positions throughout a wide range of operating conditions. Sealing is on a 6.5" diameter and speeds reach 3,250 f.p.m. Temperatures vary from external conditions of

-65° F to operating conditions of 220° F. No leakage is permissible because of the limited oil supply in the system and the dangers implied by oil leaks on an aircraft engine. The seals must be extremely compact due to critical space and installation limitations. And, sealing members must be suitable for use with AN-O-8, Grade 1100 and AN-O-9, Grade 1010 fluids, and MIL-0-5606 oil.

National Oil Seal engineers, working with Hamilton Standard, provided seals that answered the problems posed by the assembly. At the rear bearings (Fig. 1, "A"), a modified National 350,000 Syntech\* (synthetic rubber) seal was used. Modification included extending the sealing lip to increase flex action.

The seal press-fits into a 7.432" bore, yet it is only 0.406" wide and less than 0.6" deep at cross-section. At the front bearing ("B") a similar seal with a specially formed case is used.

Both seals in this assembly are National Syntech units with accurately spring-tensioned, precision-molded and precision-trimmed synthetic rubber sealing members. Syntech seals are ideal for many such applications because they operate efficiently at high



speeds and temperatures, and are unaffected by most industrial oils or fluids.

The seals used in the application are of special design to meet special sealing requirements. Many sealing problems, however, can be solved by utilizing standard designs—often at an appreciable saving in time and tooling costs. In either case, National Oil Seal Engineers are at your service to apply almost 30 years of practical sealing experience toward solution of your problem. Write today for information.

"Let Your Decision be Based on Precision"



**NATIONAL MOTOR BEARING CO., INC.**

General Offices: Redwood City, California  
Plants: Redwood City, Calif.; Downey (Los Angeles County), Calif.; Van Wert, Ohio

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\*Trade Mark Registered

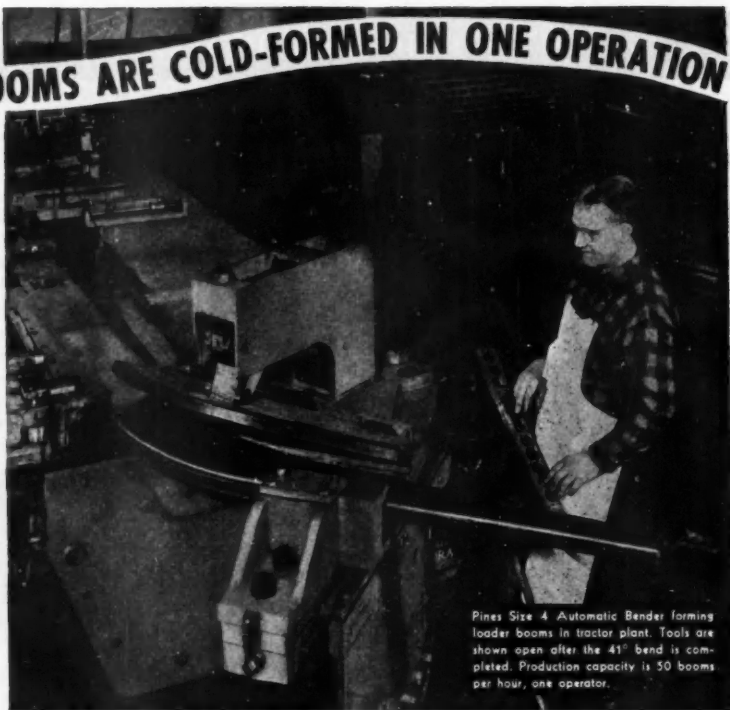
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# HOW HOLLOW BOOMS ARE COLD-FORMED IN ONE OPERATION



## on a **PINES** *Automatic* **BENDER**



Pines Size 4 Automatic Bender forming loader booms in tractor plant. Tools are shown open after the 41° bend is completed. Production capacity is 50 booms per hour, one operator.

### 41° Edge Bend in Heavy 12-Gauge Stock Simplifies Production Problem

Here's another example of how cold-forming the "Pines-Way" speed, production and lowers costs. The setup illustrated shows tooling on a Size 4 Bender used for edge bending a heavy 12-gauge (.112") hollow tractor loader boom. The pieces are fabricated with a gradual taper, and two straight U-shaped strips are arc-welded together. By adopting the Pines bending method, instead of making curved pieces on a press, a substantial reduction in die cost and scrap losses are affected.

### Smooth, Accurate Bends Produced in Tapered Section

The Bender and special tooling, engineered by Pines, produces a smooth 41° edge bend to a 34" radius. The draw bending principle employed permits holding close tolerances for easy assembly. By using a flexible floating-type mandrel, tapered to fit the inside of the workpiece, and a separate hydraulically-operated hold-down shoe that works in sequence with the clamping die, wrinkles and buckles are eliminated. One man handles the entire bending operation. The hydraulic bending and return cycle is automatic, push-button controlled.

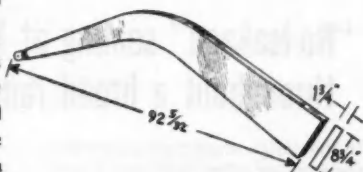


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To get a better idea of the cost-cutting advantages and unusual versatility of Pines Benders, write today for free copies of "Pines News" illustrating and describing actual bending and tooling techniques on a wide range of jobs.

**PINES** ENGINEERING CO., INC.  
Specialists in Tube Fabricating Machinery

BENDING • DEBURRING • CHAMFERING • THREADING • CUT-OFF MACHINERY



LOADER BOOM FOR FARM TRACTOR  
Workpiece is fabricated from two tapered U-shaped pieces, arc-welded together. Both right-hand and left-hand booms are formed on same machine.



View of floating-type flexible mandrel and tapered sliding pressure die. Automatic air-operated support holds mandrel in proper alignment on forward stroke, retracts for clamping. Same machine with different tooling also cold bends 3" heavy wall pipe for under-carriage loader supports.

653 WALNUT • AURORA, ILLINOIS

AUTOMOTIVE INDUSTRIES, September 15, 1952

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If you are equipped to do your own fabricating, you will find Revere Electric Welded Steel Tubing has uniform properties and can be readily formed for varied applications.

Over 25 years of experience in the manufacture of Electric Welded Steel Tubes.

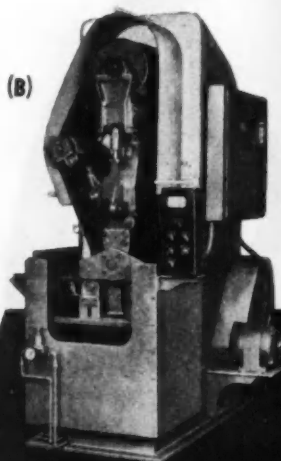
Technical and Engineering service is available. Consult us on your Steel Tube problems.

### **REVERE** COPPER AND BRASS INCORPORATED

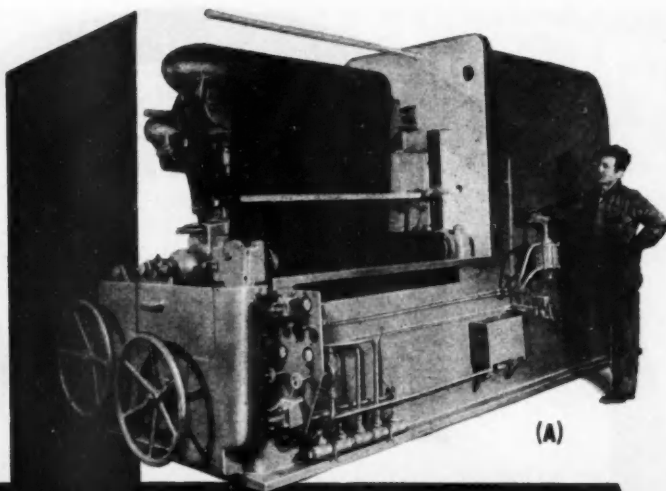
Founded by Paul Revere in 1801  
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(B)



(A)

## IF THE STOCK IS FLAT MICRO-POLISH

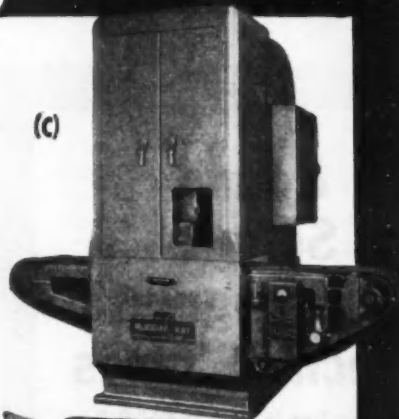
can automatically finish your job faster, better or cheaper regardless of size, shape or material.

Murray-Way, "engineered-to-the-job", Micro-Polish equipment is now being used the country over in every type of application, on every conceivable kind of material.

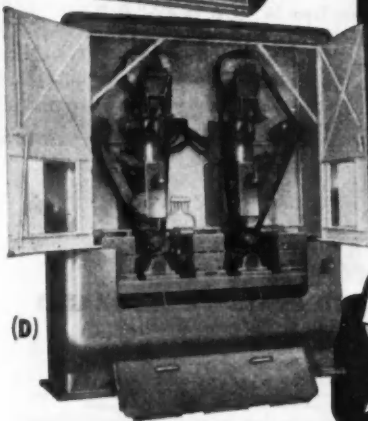
Micro-Polish is an amazingly versatile and consistently successful automatic polishing method useful on any job from the prep polishing of low grade steel sheet, to meet high quality job specifications, to the production sharpening and polishing of pruning tools.

Micro-Polish can precision finish any size, shape or length of sheet, strip or blanked stock in ferrous or non-ferrous metals, wood, fiber, plastic, rubber or leather, by wet or dry process.

The typical Micro-Polish equipment shown here demonstrates how Murray-Way engineers have adapted the process to individual job requirements.



(C)



(D)

A  
B  
C  
D

A Micro-Polish giant used in reclamation grinding of steel strip.

One of our smaller units used in polishing narrow bi-metal stock.

A versatile unit using belt conveyor to polish a variety of flat stampings and forgings.

A space saver unit for polishing flat bar stock. Two heads and two grades of belt grain accomplish the complete job without rehandling.

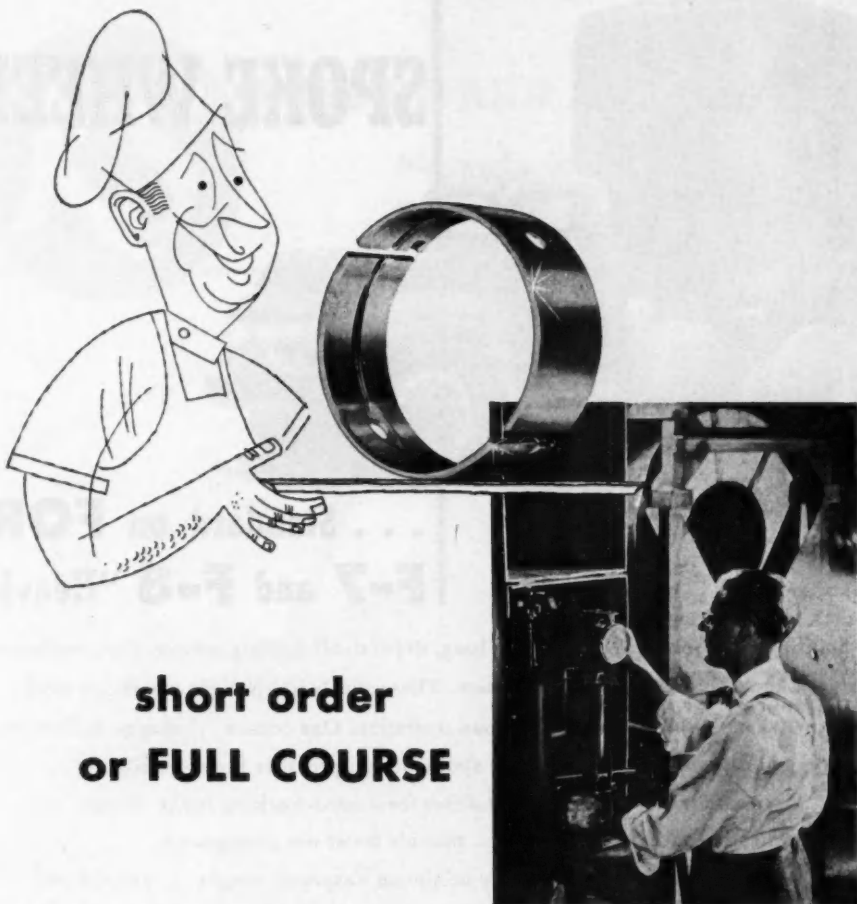
Murray-Way engineers will gladly show you how this time and cost saving method can improve your polishing operation.

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THE MURRAY-WAY CORPORATION

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When you specify our engine bearings you gain the "know-how" of more than 25 years of precision experience in the manufacture of the finest engine bearings.

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# SPOKE WHEELS

**... Standard on FORD  
F-7 and F-8 "Heavies"**

In building "Big Job" trucks that give long, dependable hauling service, Ford engineers specify spoke wheels as standard equipment. These sturdy lightweight wheels are made to stand the gaff of full pay-load operation. One reason . . . they're constructed of rugged cast steel. Another . . . the spoke design provides better ventilation . . . carries off more of the heat that arises from hard-working brake drums.

- Spoke wheels reduce "down time" . . . provide faster tire changes on tight schedules . . . assure minimum unsprung weight . . . and cut per mile operating costs. Be sure your new Ford F-7 or F-8 is equipped with spoke wheels. They're standard at no premium in price.

The spoke wheels used by Ford are made by Gunité Foundries Corporation . . . a leader in the development of superior metals and metal products since 1854.



GUNITÉ REAR TRUCK WHEEL

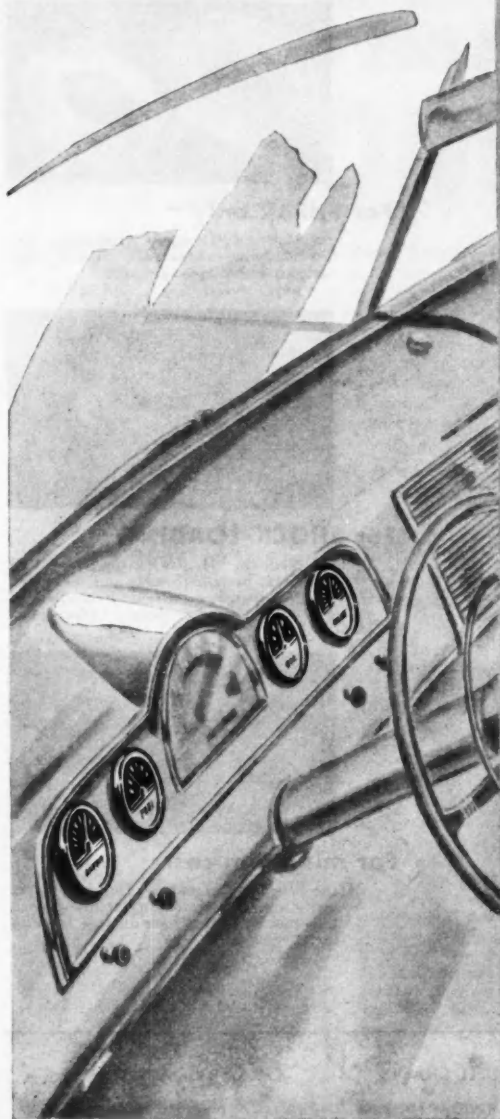


**GUNITÉ FOUNDRIES CORPORATION, Rockford, Illinois**



## DASHBOARD INSTRUMENTS

***Manufactured Under  
Rigid Quality Control***



**Oil Pressure Telegage**

**Water Temperature Telegage**

**Fuel Level Telegage**

**Ammeter**

Scientific Quality Control governs all manufacturing and assembly operations involved in the production of K S dashboard instruments and instrument clusters for passenger cars and trucks.

As a result these instruments are dimensionally accurate, easy to install; they function uniformly and assure the ultimate user years of uninterrupted service.

King-Seeley engineers are always at your service.

## **KING-SEELEY CORPORATION**

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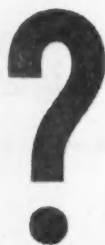
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SHEAR....  
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**These four types of  
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National's outstanding line of Lock Nuts offers you the right answer to practically any difficulty with vibration or loosening of parts... exactly the right Lock Nut for your locking problem.

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For National Lock Nuts—and for any fastener need, call your nearest National representative because National makes the most complete line of quality standard and special fasteners. For more details on solving your locking problems in STRESS—SHEAR—SHOCK... write us today for your free copy of our illustrated 24-page booklet: "National Lock Nuts."



### THE NATIONAL SCREW & MFG. COMPANY

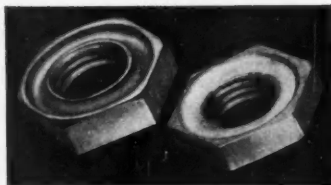
Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.  
3423 South Garfield Ave., Los Angeles 23, Cal.



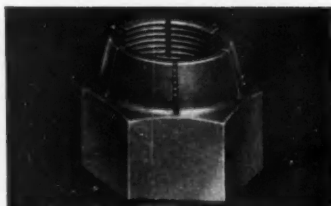
#### For severe STRESS—

the National "Drake". Two-piece, positive locking for resisting the most rigorous stress, shock or vibration in rugged, heavy equipment.



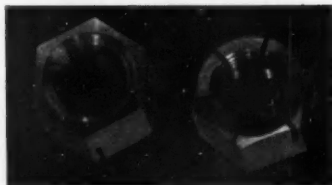
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the National "Dynamic". Extremely thin for use where clearance counts, light weight, with diaphragm lock.



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the National "Huglock". One piece, all metal. Grips bolt threads and maintains locking, seated or unseated, regardless of excessive heat, oil or moisture conditions.



#### For minimum cost—

the National "Marsden". Designed especially for effective locking at lower cost. One-piece, cantilever action, free running until seated.



FASTENERS



MODELL CHAINS



CHESTER HOISTS



# Why the leaders prefer

# PUROLATOR

## FULL-FLOW

# MICRONIC FILTERS

✓ **Full-flow rates within practical filter dimensions:**

The famous "accordion-pleated" Micronic\* filter element has up to ten times more filtering area than old-style filters—gives high flow rates in a minimum of space.

✓ **Ultra-micronic filtration:**

High flow rates are, of course, meaningless unless effective filtration is maintained, too. Electron micrographs prove that the Purolator\* Micronic filter stops particles down to submicrons—.0000039 in.!

✓ **Maximum dirt storage capacity:**

The pleated design of the Micronic filter element provides many times more dirt storage space than old-style filters. This important advantage means uniform, efficient performance and a lengthy service life.

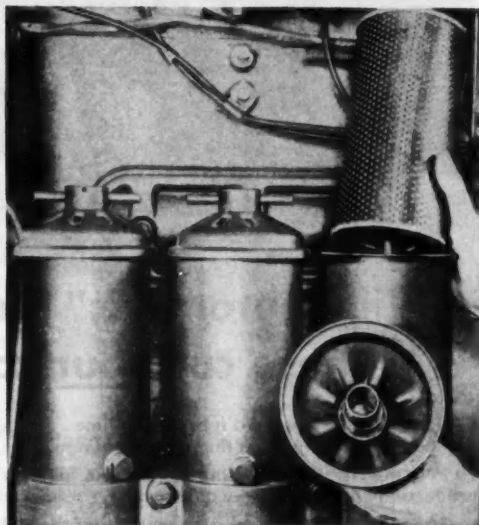
✓ **Minimum pressure drop:**

The Purolator Micronic filter element introduces a remarkably small pressure drop in the lubricating system . . . permitting pumps of practical size and simple type.

✓ **Will not remove or absorb additives:**

With Purolator Micronic filtration, you keep *all* the oil quality you pay for. The Micronic filter element will not strip additives . . . an important advantage with modern HD and heat-resistant oils.

\*Reg. U. S. Pat. Off.



Purolator Micronic Filters in a typical Diesel full-flow installation. Although the Purolator Micronic filter elements measure only 4½ in. by 9 in., each one filters 9 gallons of oil per minute, giving a total of 27 g.p.m. for the complete filter unit.

THE advantages of Purolator Full-Flow Micronic filtration—wherein *all* the oil is filtered *each time* it passes through the engine—have been dramatically demonstrated during the past few years. In some instances engine life has been increased by thousands of hours, bearing and ring wear has been reduced to almost imperceptible minimums, and engines have been made to operate efficiently where air-borne abrasives formerly destroyed them in a matter of hours. One after the other, leading makers of Diesel and gasoline

engines and vehicles are adopting full-flow lubrication . . . and standardizing on Purolator Full-Flow Micronic filters. In some fields, manufacturers are finding that full-flow lubrication is becoming a necessary feature to maintain a competitive sales position.

Time and again, in impartial tests conducted by vehicle and engine manufacturers themselves, Purolator Micronic filters have been proved best on all counts . . . fineness of filtration, long service life, ease of servicing.

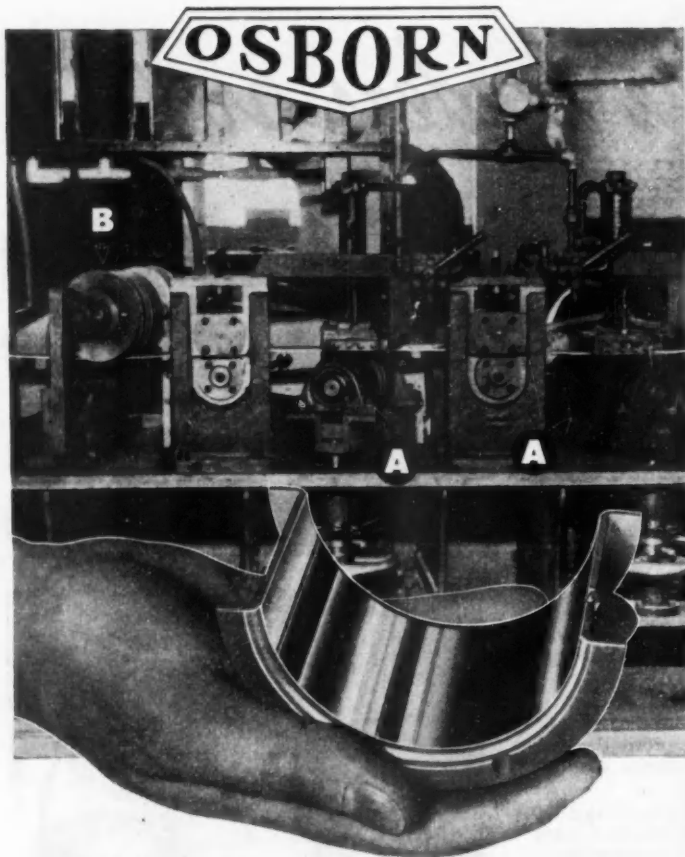
Our Engineering Department will

gladly co-operate in helping you prove—in your own way, on your own equipment—that there is no finer filter made than Purolator. Simply write, describing your equipment and filter requirements.

PUROLATOR PRODUCTS, INC.  
Rahway, New Jersey, and Toronto, Ontario, Canada  
Factory Branch Offices: Chicago, Detroit, Los Angeles

**PUROLATOR**  
MICRONIC OIL FILTER

"FIRST IN THE FIELD OF FILTERING"



## Will "automatic" ideas like these cut your costs?

**T**HIS machine does two jobs at one time . . . does them thoroughly by power brushing . . . at the push of a button.

Perhaps a similar brushing method can help cut *your* costs, boost *your* production and improve the quality of *your* products.

The machine developed with the help of the **Osborn Brushing Analyst** cleans steel-backed, babbitt-lined strip for production of automotive sleeve bearings. With the strip traveling continuously, Osborn Master Wheel Brushes (A) remove all dirt, rust and metal particles from the steel surface. Osborn Monarch Sections (B) then thoroughly clean the babbitt side.

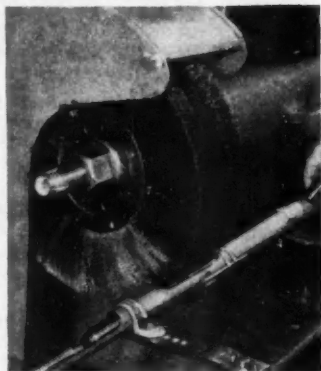
This is typical of the cooperation which your **Osborn Brushing Analyst** can give *you* to solve problems of product cleaning, burr removal, roughing, polishing and finishing. For help, call or write *The Osborn Manufacturing Company, Dept. 821, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

# Osborn Brushes

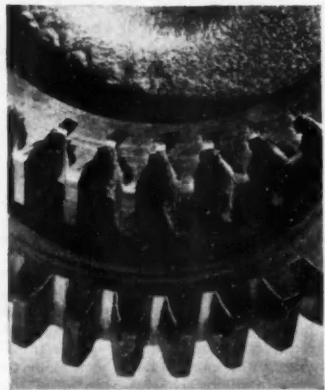
OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



**SAVES 12 MEN.** This is one station of a five-station rotary automatic machine equipped with Osborn power brushes that removes burrs and sharp corners or clutch disc teeth. Formerly done by hand. Saves 12 skilled men.



**9 TIMES AS FAST.** This simple pipe fixture provides the means of cleaning threads of set screws. Can be applied to many cylindrical parts. Time was cut from 18 seconds to 2 seconds with this Osborn brushing idea.



**10 TIMES AS FAST.** This shows two gears before and after deburring by a new Osborn power brushing method. Note smooth uniform results. Time was cut from 3 minutes to 18 seconds.



# Check Why DOLLAR for DOLLAR You Get More with **MAGNAFLUX Equipment** for MAGNETIC PARTICLE INSPECTION

When you buy equipment for magnetic particle inspection, you are paying to get certain definite results . . . positive detection and identification of defects that will affect the fabrication or service of your part or product. You want inspection at the lowest possible cost per piece, *that saves you far more than it costs*, with intelligent aid for process control.

To be sure of getting these results more users choose Magnaflux equipment and methods, for more inspection operations than all other methods combined. That's a remarkable record—and well worth remembering when you consider buying any kind of inspection equipment.

Magnaflux not only pioneered magnetic particle inspection, it has continuously built refinements and improvements into Magnaflux Units to make inspection faster, simpler and surer. With Magnaflux, your operators and supervisory personnel receive complete initial training from Magnaflux engineers, and periodic schooling for as long as you own and use the Magnaflux equipment. The complete knowledge and engineering and research advice of Magnaflux Corporation are at your disposal *always*.

Your inspection dollars buy more—in value, performance and security—when you select "Inspection with Magnaflux."

**COST:** Portable units from \$485, fixed "wet" type units from \$2190.

## Just a few of the advantage features available in MAGNAFLUX EQUIPMENT

MAGNAGLO accessories are available for all Magnaflux units, to furnish fluorescent indications with maximum visibility at maximum speed. Gives lowest cost inspection per piece.

Proven magnetizing power circuit control insures positive, uniform detection results. Magnaflux inspection is never erratic, hit-or-miss.

30 point demagnetization system can be right in the unit—eliminates need for sepa-

rate, time consuming demagnetization operation.

Switch controlled, air operated headstock for faster positioning and clamping of parts. Effortless gear adjusted tail stock. More efficient agitation system to insure uniformity of the bath—essential to proper inspection.

Raised heads and coils can handle disc shaped parts up to 36" in diameter, or larger with fixtures available.



## VARIETY OF "WIDE USE" UNITS

Above unit is one of many types taking any part up to 54" long for efficient inspection. Similar units to 96" or 144", or 192", as required. Both A. C. and D. C. magnetizing currents available, and many convenience, speed, and special purpose accessories. Illustrated unit has Magnaglo hood and black lights, to give highest speed inspection of most reliability on irregular shapes.

## MAGNAFLUX CORPORATION



5904 Northwest Highway  
Chicago 31, Illinois



Reg. U. S. Pat. Off.

New York 18 • Cleveland 15 • Detroit 11 • Dallas 9 • Los Angeles 58  
Export Distributor: Curtis Wright Corp.  
In Canada: Williams & Wilson, Ltd.

A few words about



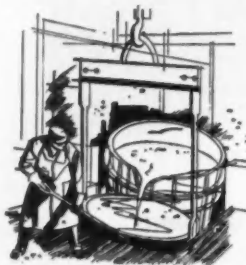
# GRAINAL ALLOYS

and how they are

*Metallurgically Engineered*

to produce greater uniformity  
in your boron treated steels

In our  
Laboratories  
every aspect of  
Grainal Alloys is  
carefully studied.



In our Plant  
exact methods of  
production protect  
the quality of  
Grainal Alloys.



In your Mill,  
greater uniformity  
in your boron steels.

*Uniformity. Consistent Results.*

These are the demands of today's steelmaker. To make certain they are answered, we have *metallurgically engineered* our Grainal alloys.

In our laboratories, in our plant, every care is taken to insure a product of the correct composition and highest quality.

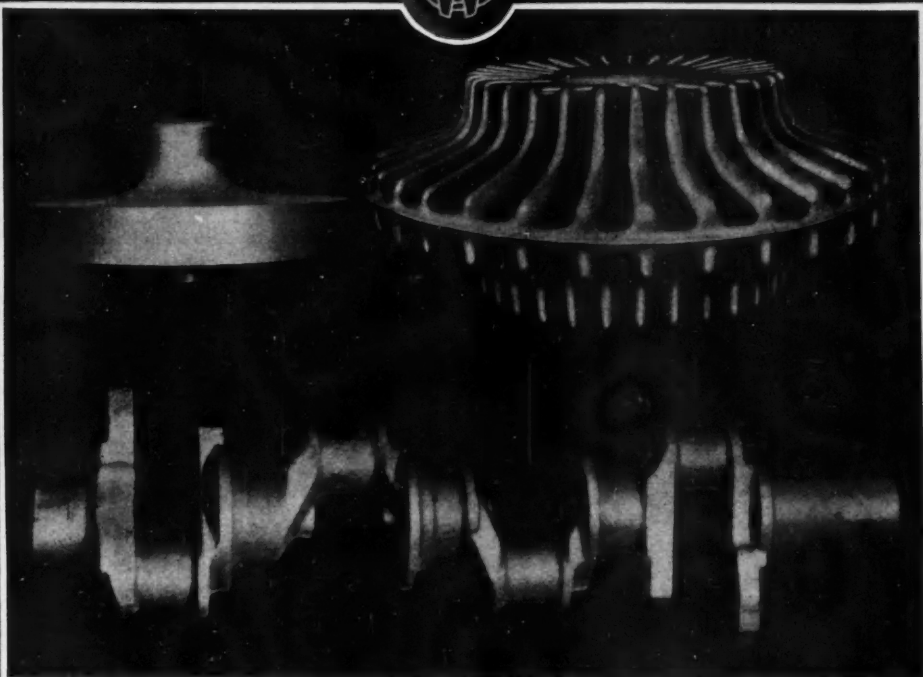
*Result:* A uniform product that enables you to produce steels of consistently high hardenability. And note—with Grainal you achieve this result with a minimum boron addition.

**VANADIUM CORPORATION OF AMERICA**



MAKERS OF ALLOYS, CHEMICALS AND METALS

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**Standard of the Industry for More Than Sixty-Five Years**

# WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL  
WORCESTER, MASSACHUSETTS  
HARVEY, ILLINOIS      DETROIT, MICHIGAN

MIL-P-116A, Military specification for Methods of Preservation dated March 25, 1952, Method IIc "Cushioned Item Bag" (five pound weight limit).

**READ AND SAVE  
THIS ISSUE FOR  
FUTURE REFERENCE**

## MILITARY PACKAGING SIMPLIFIED 5 of a series



1. Fragile part ready for application of dry, neutral cushioning material. Weight of object being packaged cannot exceed five pounds.



2. Application of cushioning, with proper unit of desiccant included. After wrapping, apply tape if necessary to hold material snugly to part.



3. Cushioned part inserted in pouch constructed of MIL-B-131A Class D material. Pouches should be sufficiently large to avoid any strain on heat-sealed seams.



4. Completed unit package. Properly identify contents and apply Method II warning label before placing in carton.

**Note:** MIL-P-116A was approved by the Departments of Army, Navy, and Air Force for use of the procurement services of the respective departments.

### FREE MANUAL

Write on your stationery for this free Military Packaging Handbook. It will save you time and money.



### ANNOUNCING A REVOLUTIONARY DEVELOPMENT

Reynolds has perfected a new method of applying polyethylene to foil-backed stock for military packaging, which is a great advance over the old method of laminating it as a film. The result is a barrier material exceptional in both efficiency and economy. Reynolds RM-245, shown in the application illustrated here, is produced by this new process. It is composed of foil laminated to kraft, then polyethylene applied to the foil for heat-sealing as well as stretch characteristics. Performance tests have proved this material highly satisfactory for packing small fragile objects (not over 5 lbs.), and it cuts costs.

Reynolds RM-151, consisting of cloth instead of kraft, is also produced by this new cost-cutting method and is available for Method IIa and Method IIb packaging. This material also exceeds MIL-B-131A performance tests.

For expert help on any packaging problem call your nearest Reynolds Aluminum Sales Office and ask for "the packaging man"; or write Reynolds Metals Company, 2500 South 3rd Street, Louisville 1, Ky.



# REYNOLDS ALUMINUM



# NEW

## jet black

## PARCO BLACK

### **A corrosion resistant coating from a single bath!**

**Here's a new Parker product** that produces a better black finish on iron and steel. Parco Black is jet black and durable, with about ten times the corrosion resistance of conventional blacks.

The Parco Black coating is chemically produced and is an integral part of the metal surface. It is not a dye.

Treatment with Parco Black is simple, safe and easy. Parts to be treated are immersed in the low-temperature, non-caustic processing solution from 15 to 30 minutes. After rinsing and

drying, they are oiled or waxed and the durable deep black finish is ready for service.

There's no limitation on size or shape of articles treated. Any iron or steel product that can be immersed in the tank can have the benefits of Parco Black. Can be used on threaded and machined parts where a pleasing black finish is wanted.

For simpler, more economical production of a finer black finish on iron and steel, use Parco Black. Write for full information today.

## PARKER

\*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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## RUST PROOF COMPANY

2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

**BONDERITE**—corrosion resistant paint base • **BONDERITE and BONDERLUBE**—aids in cold forming of metals  
**PARCO COMPOUND**—rust resistant • **PARCO LUBRITE**—wear resistant for friction surfaces



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METALS MARKET PLACE OF THE WORLD

METAL MARKETPLACE OF THE WORLD



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**SHOW**

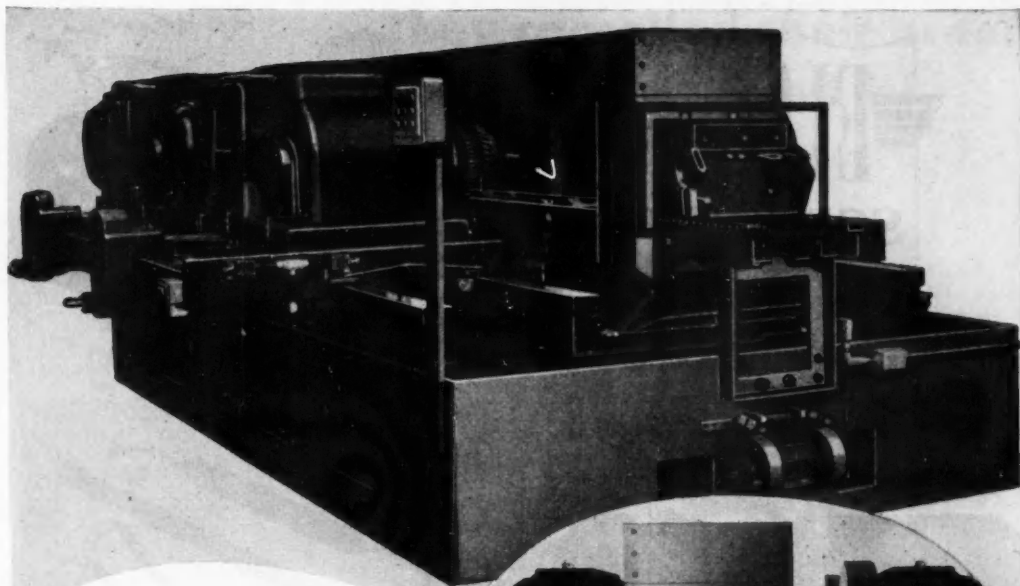
of its kind  
under the sun...

the big

**'52**

metal show

OCTOBER 20-24 • PHILADELPHIA, PA.



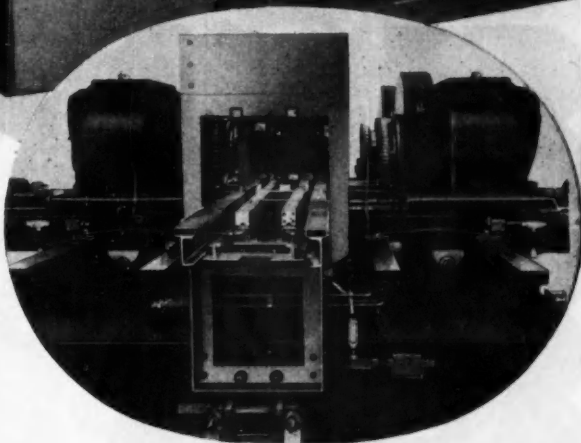
**ANOTHER**

# *Automatic Transfer Milling Machine*

DESIGNED AND BUILT BY

**MOTCH & MERRYWEATHER**

**to Rough-Mill and Finish-Mill Both Ends of Automotive Cylinder Blocks**



*End view showing transfer mechanism  
and 75 h. p. milling heads in retracted,  
accessible position.*

- Cylinder blocks are fed to the machine, transferred from station to station, and discharged to the next operation. This machine forms an important link in a completely automatic production line.

Manufactured by

**THE MOTCH & MERRYWEATHER MACHINERY CO.**

CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

**PRODUCTION - WITH - ACCURACY • MACHINES AND EQUIPMENT**





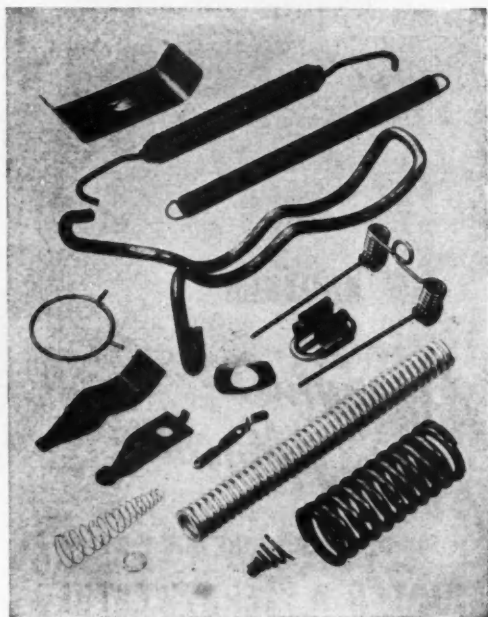
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MACHINE SCREW NUTS • TAPPING SCREWS  
THREAD-CUTTING SCREWS • PHILLIPS AND  
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CAP SCREWS • LAG SCREWS • DRIVE SCREWS  
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• The first step toward solving your spring problems is to turn to us for help. We take it from there. Skilled workmanship, combined with modern production facilities, results in our ability to produce springs and small parts in any quantity to suit your needs. Call or write today.

Producing Clutch Pressure Springs  
... Clutch Damper Plate Springs

*The* **U. S. STEEL WIRE SPRING Co.**

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CLEVELAND 5, OHIO

## They cancelled their order ... and we liked it!

ONE of our good customers ordered a 1500 lb. CECO-DROP, and shortly thereafter cancelled the order.

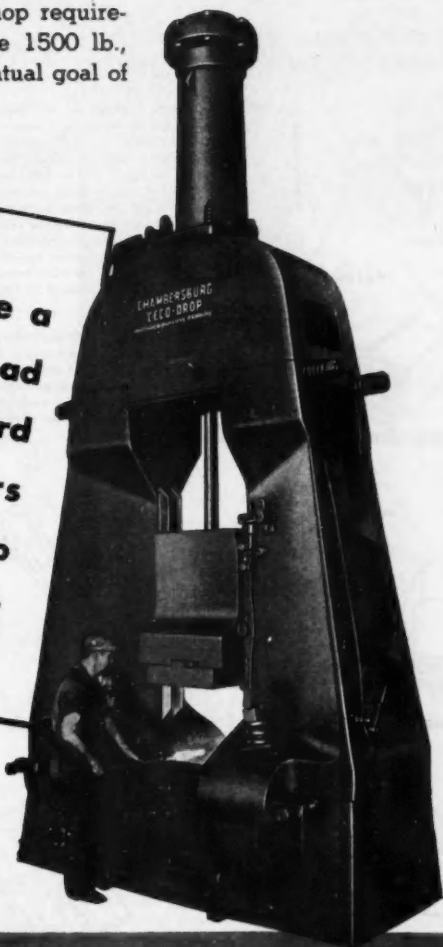
We don't like cancellations any better than anyone else, but this one we *did* like . . . after we learned the reason for it: In re-assessing their forge shop requirements, they decided they needed, not one 1500 lb., but two 3000 lb. Ceco-Drops, with an eventual goal of a 100% Ceco-Drop Shop

*The trend is  
definitely  
toward  
Ceco-Drops*

QUOTATION:  
"I would give a  
good deal if I had  
all of our board  
drop hammers  
out of the shop  
and nothing but  
Ceco-Drops in."

*Write for a copy of Bulletin 11-L-O and  
learn more about this modern hammer.*

CHAMBERSBURG ENGINEERING COMPANY  
Chambersburg Pennsylvania



# CHAMBERSBURG

## THE HAMMER BUILDERS

for best marking results use

# MARKEM<sup>®</sup>



## METHODS

MARKEM MACHINES  
MARKEM TYPE  
MARKEM INKS

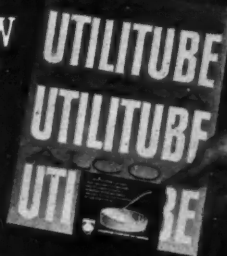
FOR MARKING PRODUCTS, PARTS,  
PACKAGES, TAPES, TAGS, LABELS



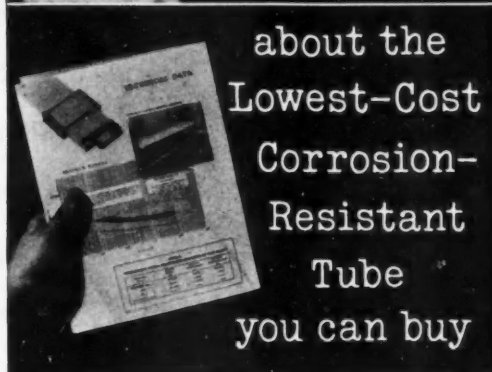
Markem Methods are engineered to solve specific marking problems. The proper combination of a Markem marking machine, Markem type and Markem ink is matched to the individual requirements. Not only are the properties of the surface itself considered, but also local conditions of temperature and humidity together with your own handling techniques during production, storage and packaging. That is why it is so important that the Markem Method be followed completely.

When you have a marking problem, ask Markem about it. Send a sample of the item to be marked and details of your needs. Markem engineers have worked out practical solutions for many manufacturers. Markem Machine Company, Keene 8, N. H.

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Free  
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gives  
Complete Facts



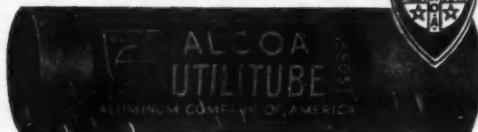
about the  
Lowest-Cost  
Corrosion-  
Resistant  
Tube  
you can buy

Write for this new booklet on Alcoa Utilitube<sup>®</sup>, the all-purpose aluminum tube that saves up to 40 per cent on tube costs. Booklet contains complete information on application, installation and service data . . . plus physical and mechanical properties.

Alcoa Utilitube is ideal for carrying air for instrument and brake lines—gasoline and fuel oil for internal combustion engines—lubricating oil for engines and machines—fluids for hydraulic systems.

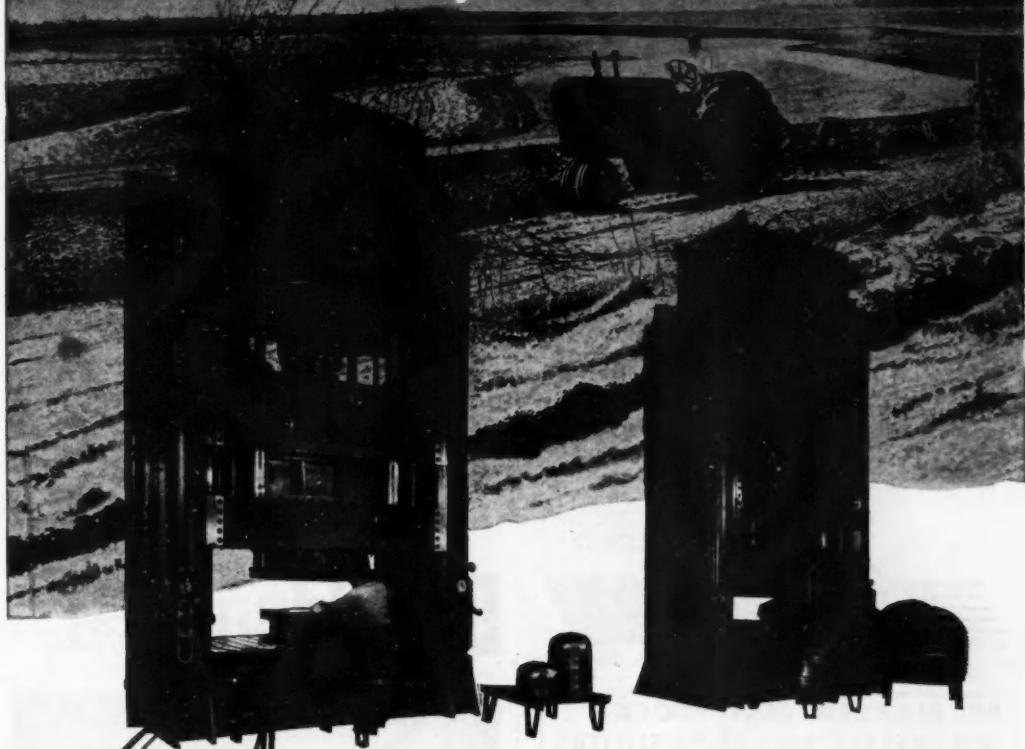
Aluminum tube fittings are available from leading tube fitting distributors.

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835-J Gulf Building - Pittsburgh 19, Pa.





another product of "Quality Avenue" at MASSEY-HARRIS



*Quality*

COUNTS . . . AND YOU GET IT WITH H-P-M

Quality is the theme at Massey-Harris Company . . . in fact, the production line in their tractor plant at Racine, Wisconsin is known as "Quality Avenue".

An important part of "Quality Avenue" are the H-P-M 400-ton capacity Fastraverse Presses shown above producing parts for the Model 44 Massey-Harris Tractor. The triple action press at the left forms two grille tops in a single operation; a 28" x 30" blank is drawn 11" deep. The double action press at the right produces fenders from a blank 43" x 36", drawn to a depth of 5". Both presses average 16 hours a day, 5 days a week.

The men at Massey-Harris will tell you of the outstanding performance of their H-P-M presses . . . less than 1% scrap loss . . . evidence that companies genuinely conscious of quality in their own product also look for quality in the products they buy.

Yes, we at H-P-M, too, know quality counts . . . and that you'll get it in every H-P-M Press . . . quality workmanship and materials . . . backed by H-P-M's 75 years of specialized experience in the field of hydraulics.

Invite us in at the planning stage to discuss your production problem, won't you?



## THE HYDRAULIC PRESS MFG. COMPANY

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MOUNT GILEAD, OHIO, U. S. A.

Builders of Presses for the Metal Working & Processing Industries • Plastics  
Molding Presses • Die Casting Machines • Hydraulic Pumps, Valves & Power Units

Over 85% of the torque wrenches used in industry are

## STURTEVANT TORQUE WRENCHES

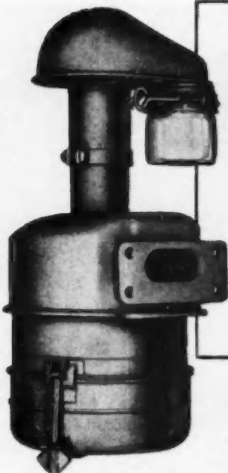
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- Permanently Accurate
- Practically Indestructible
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- All Capacities

in inch ounces  
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All sizes from  
0-4000 ft. lbs.

Every manufacturer,  
design and production  
man should have this valuable  
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ADDISON [QUALITY] ILLINOIS



## Donaldson Air Cleaners

are  
**EASY TO  
SERVICE!**

### CUSTOM-BUILT TO FIT YOUR ENGINE

Write our engineering department  
for air cleaner recommendations.

The simplicity and speed of servicing Donaldson Air Cleaners encourages regular attention by the machine operator. No tools are needed to remove oil cup. Cleaning cup and re-filling with oil is a two-minute job. Removable tray makes cleaning out chaff, lint, leaves and larger foreign particles simple and fast.

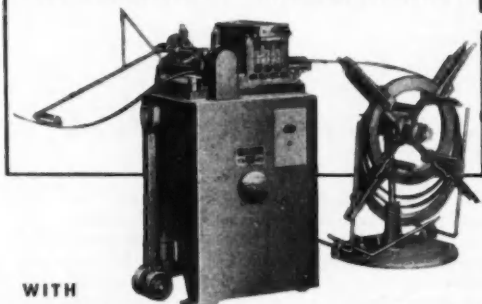
**DONALDSON CO. INC.**  
666 Pelham Blvd., St. Paul 4, Minn.

Grinnell Division: Grinnell, Iowa

Donaldson Company (Canada) Ltd., Chatham, Ontario

# Donaldson Air Cleaners Mufflers

## STRAIGHTEN COIL STOCK FOR PRESSES, SHEARS OR SLITTERS



WITH

## LITTELL Variable Speed STRAIGHTENING MACHINES

Output rises, costs drop when coil stock is fed to the press, the shear, or the slitter through a Littell Straightening Machine. Coil stock comes out of a Littell Straightener flat, with curvature removed. Equipped with variable speed transmissions, Littell Straighteners are easily adjusted to meet a wide range of speed requirements. Thirteen medium and heavy duty models straighten coil stock of all standard widths and thickness.

F. J.

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ESTABLISHED 1866

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## HI-EFF BALANCING

- *Fast*
- *Accurate*

This 250-pound blower fan is being balanced to a 1 ounce inch on a HI-EFF Balancing Machine. The same Balancer is used for a wide variety of pieces up to 1200 pound size. It provides rapid balancing with accuracy indicated by the following tolerances:

Pieces weighing 500 to 1200 pounds, within 2 oz. inches.

Pieces weighing 75 to 500 pounds, within 1 oz. inch.

Pieces of lighter weights to diminishing tolerances down to .02 oz. inch.

HI-EFF Balancing machines are available in 3 sizes with work piece diameters up to 48 inches. These may be equipped with HI-EFF Hand Weighing Mechanism (as shown) or HI-MAX Direct Reading Mechanism. Write for folder "Balance Your Product."

## TAYLOR DYNAMOMETER AND MACHINE COMPANY

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Manufacturers of HI-EFF Hydraulic Dynamometers — Static Balancing Machines — Sensitive Drilling Machines.

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## MOLDED RUBBER PRODUCTS

**Y**OUR problem is our problem when molded rubber products are involved. Take advantage of Lorraine's modern facilities and experience which has served the automotive, aviation and allied industries for many years.

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"O" RINGS AND HYDRAULIC PACKINGS  
Skilled in AMS and ASTM Specifications and Silastic Material

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Straight Side—Double Crank  
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CAPACITIES 50 to 400 tons  
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FOR OVER 50 YEARS  
MOLINE "Hole-Hog"  
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MACHINE TOOLS  
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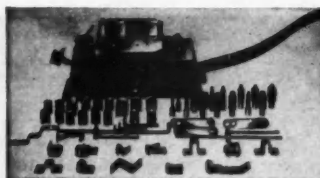


DRILLING  
BORING  
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TAPPING and  
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**Fellows**  
MACHINES AND TOOLS FOR  
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MULTIFORM  
BENDER-CUTTER

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Switch Material • Spikes and Bolts • Track  
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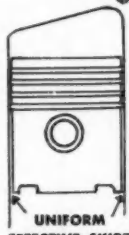
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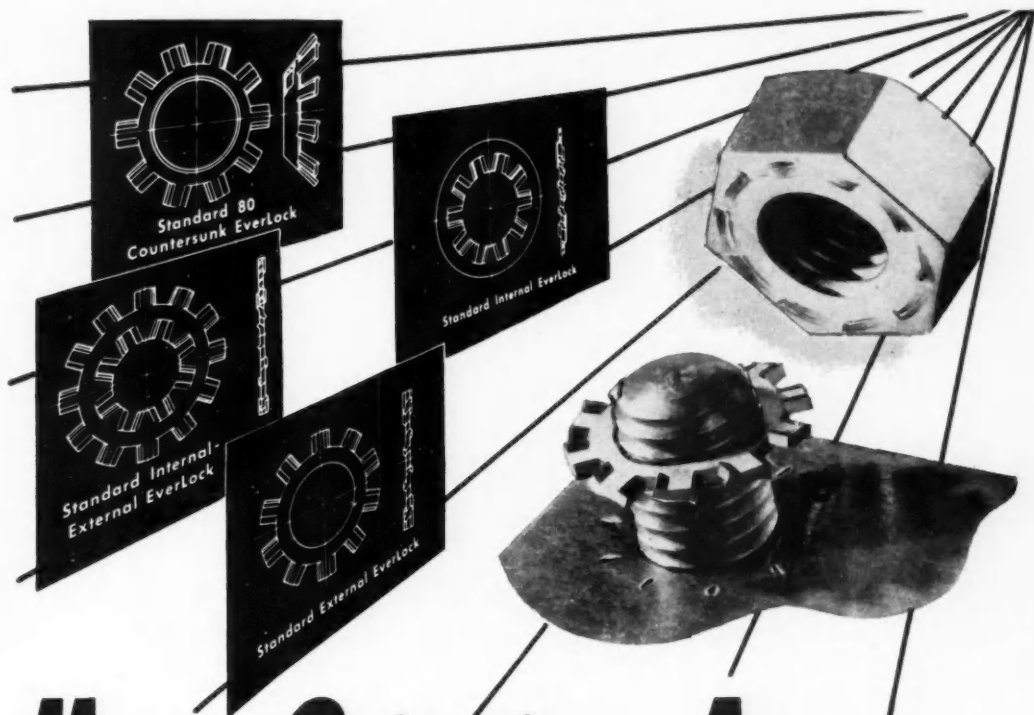
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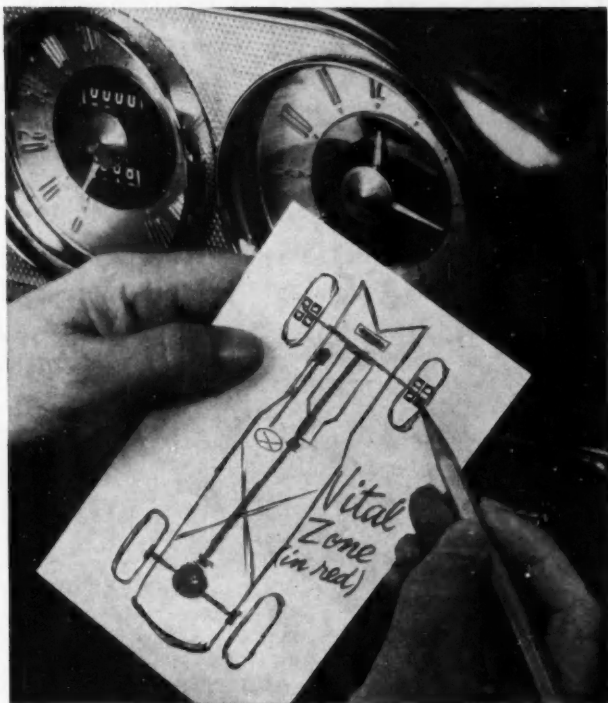
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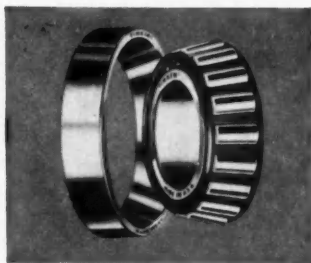
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